INTERNATIONAL

International Education Series

EDITED BY

WILLIAM T. HARRIS, A. M., LL. D.

Volume IX.

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EDITED BY W. T. HARRIS.

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INTERNATIONAL EDUCATION SERIES

THE MIND OF THE CHILD

PART II

THE DEVELOPMENT OF THE INTELLECT

OBSERVATIONS CONCERNING
THE MENTAL DEVELOPMENT OF THE HUMAN BEING
IN THE FIRST YEARS OF LIFE

BY

W. PREYER

PROFESSOR OF PHYSIOLOGY IN JENA

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TRANSLATED FROM THE ORIGINAL GERMAN

BY H. W. BROWN

TEACHER IN THE STATE NORMAL SCHOOL AT WORCESTER, MASS.

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EDITOR'S PREFACE.

This second volume contains the further investigations of Professor Preyer on the mind of the child. The former volume contained the first and second portions, devoted respectively to the development of the senses and of the will. The present volume contains the third part, treating of the development of the intellect; and three appendixes are added containing supplementary matter.

Professor Preyer considers that the development of the power of using language is the most prominent index to the unfolding of the intellect. He differs with Professor Max Müller, however, on the question whether the operation of thinking can be carried on without the use of words (see the recent elaborate work of the latter on "The Science of Thought").

At my suggestion, the painstaking translator of this book has prepared a full conspectus, showing the results of Professor Preyer's careful observations in a chronological order, arranged by months. This considerable labor will render the book more practical, inasmuch as it will enable each reader to see at a glance the items of development of the child in the

several departments brought together in epochs. This makes it possible to institute comparative observations under the guidance of Professor Preyer's method. I think that I do not exaggerate the value of this conspectus when I say that it doubles the value of the work to the reader.

WILLIAM T. HARRIS.

CONCORD, MASS., *November, 1888.*

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A CONSPECTUS OF THE OBSERVATIONS OF PROFESSOR PREYER ON THE MIND OF THE CHILD.

ARRANGED CHRONOLOGICALLY BY MONTHS, FOR THE CONVENIENCE OF THOSE WHO WISH TO VERIFY THESE OBSERVATIONS, OR TO USE THEM AS A GUIDE IN THEIR OWN INVESTIGATIONS.

By H. W. BROWN.

FIRST MONTH.

SENSES.*

Sight.—*Light.*—Five minutes after birth, slight sensibility to light (2). Second day, sensitiveness to light of candle (3). Sixth and seventh days, pleasure in moderately bright daylight (3, 4). Ninth and tenth days, sensitiveness greater at waking than soon afterward (3). Sleeping babes close the eyes more tightly when light falls on the eyes (4). Eleventh day, pleasure in light of candle and in bright object (3).

Discrimination of Colors.—Twenty-third day, pleasure in sight of rose-colored curtain (6).

Movements of Eyelids.—First to eleventh day, shutting and opening of eyes (22). Irregular movements (23). Lid closed at touch of lashes from sixth day on (26). Twenty-fifth day, eyes opened and shut when child is spoken to or nodded to (30).

Pleasure shown by opening eyes wide, displeasure by shutting them tightly; third, sixteenth, and twenty-first days (31).

Movements of Eyes.—First day, to right and left (35). Tenth

* Under "Senses" and "Will" the numbers in parentheses indicate pages in Vol. I.

day, non-coördinated movements (36). Third week, irregularity prevails (37).

Direction of Look.—Eleventh day, to father's face and to the light (43). Upward look (43). Twenty-third day, active looking begins (44). Twenty-third and thirtieth days, a moving light followed (44).

Seeing Near and Distant Objects.—Twelfth day, hypermetropia (60).

Hearing.—First days, all children deaf (72). Fourth day, child hears noises like clapping of hands (81). Eleventh and twelfth days, child quieted by father's voice: hears whistling. Twenty-fifth day, pulsation of lids at sound of low voice. Twenty-sixth day, starting at noise of dish. Thirtieth day, fright at loud voice (82).

Feeling.—*Sensitiveness to Contact.*—At birth (97–105). Second and third days, starting at gentle touches. Seventh day, waked by touch on face (105). Eleventh day, lid closed at touch of conjunctiva more slowly than in adults (103).

Perception of Touch.—First gained in nursing (110).

Sensibility to Temperature.—At birth, cooling unpleasant. Warm bath agreeable. Seventh day, eyes opened wide with pleasure from bath (112). First two or three years, cold water disagreeable (114). Mucous membrane of mouth, tongue, lips, very sensitive to cold and warmth (115).

Taste.—*Sensibility.*—At birth (116–118). First day, sugar licked (118). Second day, milk licked (119). Differences among newly-born (120). Sensation not merely general (122).

Comparison of Impressions.—During nursing period child prefers sweet taste (123). Second day, child accepts food that on the fourth he refuses (124).

Smell.—*Faculty at Birth.*—Strong-smelling substances produce mimetic movements (130).

Discrimination.—Eighth day, groping about for nipple (134).

Organic Sensations and Emotions.—*Pleasure.*—First day, in nursing; in the bath; in the sight of objects; in the light (141).

Discomfort.—First days, from cold, wet, hunger, tight clothing, etc. (147).

Hunger.—First days, manifested in sucking movements, crying, restlessness (152). Cry differs from that of pain or of satisfaction. Other signs of hunger (153).

Satiety.—Third to fifth week, the nipple pushed away with the

lips: mouth-piece of bottle ditto. Tenth day, smile after eating. Fourth week, signs of satisfaction; laughing, opening and half shutting eyes; inarticulate sounds (157).

Fatigue.—From crying and nursing (159). Second and third weeks, from use of senses (160). First month, sleep lasts two hours; sixteen of the twenty-four hours spent in sleep (162).

WILL.

Impulsive Movements.—Outstretching and bending of arms and legs just after birth; contractions, spreading and bending of fingers (205). Grimaces (207). Wrinkling of forehead (309). First day, arms and legs take same position as before birth (206). Second week, stretching of limbs after waking (205).

Reflex Movements.—In case of light-impressions (34–42). First cry (213). Sneezing of newly-born (214). Coughing, ditto. (216). Seventh day, yawning (215). First day, spreading of toes when sole of foot is touched (224). First day, hiccough (219). First five days, choking (218). Wheezing, yawning (215). Seventh day, respiration irregular (217). Ninth day, clasping (243). Tenth day, lips protruded (283). Fourteenth day, movement of left hand toward left temple (220). Twenty-fourth day, snoring (215).

Instinctive Movements.—First to third day, hands to face. Fifth day, fingers clasp firmly; toes do not. Sixth day, hands go into eye (244). Seventh day, pencil held with toes, but no seizing. Ninth day, no clasping by sleeping child (245). Sucking (257–261). At end of first week, lateral movements of head (264). Third week, clasping with fingers, not with thumb (245).

Expressive Movements.—Twenty-sixth day, smile of contentment (296). Twenty-third day, tears flow (307). Crying, with tears, and whimpering, become signs of mental states (308).

INTELLECT.*

Memory first active in the departments of taste and of smell; then in touch, sight, hearing (5). Comparison of tastes (I, 123). Vowel-sounds in first month (67). Sounds in first six months (74). Sounds made in crying and screaming, *u-ä* (101). Twenty-second day, association of the breast with nursing (I, 260).

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* Under "Intellect" the numbers in parentheses indicate pages from Vol. II, unless otherwise stated.

SECOND MONTH.

SENSES.

Sight.—*Light.*—Bright or highly-colored objects give pleasure (4).

Discrimination of Colors.—Forty-second day, pleasure in sight of colored tassels (7).

Movements of Eyelids.—Fifth week, irregular movements of lids. Eighth week, lid covering iris (23). Twenty-fifth day, opening and shutting eyes in surprise (30). Fifty-seventh and fifty-eighth days, winking. Sixtieth day, quick opening and shutting in fright (26).

Movements of Eyes.—Thirty-first day, strabismus rare. Forty-sixth to fiftieth day, very rare. Fifty-fifth day, irregular movements rare, but appearing in sleep till the sixtieth day (37).

Direction of Look.—Fifth week, toward the Christmas-tree (45). Thirty-ninth day, toward tassels swinging (46). Seventh week, moving lamp or bright object followed (45).

Hearing.—Fifth week, child does not sleep if persons walk or speak. Starting at noises. Sixth week, starting at slight noises even in sleep; quieted by mother's singing. Seventh week, fright at noise is greater (83). Sensibility to musical tones, ditto. Eighth week, tones of piano give pleasure (84).

Touch.—Thirty-eighth day, movements caused by touch of water (107). Forty-first day, reflex movement of arms caused by a general slight agitation (105, 106). Fiftieth and fifty-fifth days, closing of eyelid at touch of eyelash (103). Seventh week, upper lip sensitive (100).

Organic Sensations and Emotions.—Pleasure in musical sounds (141); in sight of human face (142). Reflexive laughing (145). Sixth week, fretfulness and hunger (155). Eighth week, fatigue after hearing piano-playing (160). Sleep of three, sometimes of five or six hours (162).

WILL.

Impulsive Movements.—Of eyes before waking, also twistings and raisings of trunk (206). Seventh week, number of respirations twenty-eight to the minute (217).

Reflex Movements.—Of right arm at touch of left temple (220). Forty-third day, sneezing caused by witch-meal (215). Fifth week, vomiting (219). Eighth week, laughing caused by tickling (225).

Instinctive Movements.—Seventh week, clasping not yet with thumb. Eighth week, the four fingers of the child embrace the father's finger (245).

INTELLECT.

Speech.—Forty-third day, first consonant; child says *am-ma;* also vowel-sound *ao.* Forty-fourth day, syllables *ta-hu;* forty-sixth day, *gö, örö;* fifty-first day, *ara;* eighth and ninth weeks, *örrö, arra,* frequent (102).

THIRD MONTH.

SENSES.

Sight.—*Movements of the Eyelids.*—Eyelid not completely raised when child looked up (23). Irregular movements of eyes appear (though rare) up to tenth week; at three months are no more observed (37).

Direction of Look.—Sixty-first day, child looked at his mother and gave a cry of joy; the father's face made the child gay. Sixty-second day, look directed at a swinging lamp (46).

Seeing Near and Distant Objects.—Ninth week, accommodation apparent (54).

Hearing.—Ninth week, sound of watch arouses attention; other noises (84). Eleventh week, head moved in direction of sound (85). Eighty-first day ditto. (47). Twelfth week, sudden turning of head toward sounding body (85).

Organic Sensations and Emotions.—*Pleasure.*—Smile at sight of the mother's face (145).

Unpleasant Feeling.—From some internal cause (151).

Fatigue.—Sucking tiresome (159). Sleep of four or five hours without waking (162).

Hunger.—Tenth week, child hungry three times or more in a night (155).

WILL.

Reflex Movements.—Respirations, thirteenth week, twenty-seven to the minute (217). Hiccough frequent; stopped by use of sweetened water (219).

Instinctive Movements.—Eleventh week, pencil held, but mechanically; thumb not used in clasping (245). Twelfth week, eighty-fourth day, contra-position of thumb reflexive (245, 246). Thirteenth week, thumb follows fingers more readily (246). Eleventh week, head balanced occasionally. Twelfth week, some gain in holding

head. Thirteenth week, head tolerably well balanced (264). Seizing merely apparent (246). No voluntary movement (266).

INTELLECT.

Eighty-first day, seeking direction of sound (I, 47).

Speech.—Consonant *m* frequent (67). Sixty-fourth day, *ma* (102). Sixty-fifth day, *nei nei nei* and once *a-omb*. Sixty-sixth day, *la, grei, aho, ma*. Sixty-ninth day, *mömm* and *ngö*. Seventy-first day, *ra-a-ao*. Seventy-sixth day, *nä* and *näi-n*. Seventy-eighth day, *habu*. Twelfth week, *a-i* and *uão, ä-o-a, ä-a-a* and *o-ä-ö* (103).

Feeling of Self.—Eleventh week, child does not see himself in mirror (197).

FOURTH MONTH.

SENSES.

Sight.—*Movements of Eyelids.*—Ninety-eighth day, brow wrinkled when look is upward (24). Fifty-seventh day, winking (26). Fifteenth and sixteenth weeks, ditto (27). Seventeenth week, objects seized are moved toward eyes; grasping at objects too distant (55).

Movements of Eyes.—No more non-coördinated (37).

Direction of Look.—Fourteenth week, following person moving. One hundred and first day, following pendulum. Sixteenth week, gazing at sides and ceiling of carriage and at objects (48).

Hearing.—Sixteenth week, head turned toward sound with certainty of reflex (85).

Feeling.—Seventeenth week, eyes are closed when a drop of water touches lashes (103). Fourteenth week, sleeping child throws up arms at sudden touch (106).

Organic Sensations and Emotions.—Pleasure in grasping at objects (142). Fifteenth week, intervals between meals three or four hours (155). Sleep lasts five or six hours (162). Twenty-second week, astonishment at seeing father after separation (173). Fourteenth week, smile of satiety. Seventeenth week, joy in seeing image in mirror (297).

WILL.

Reflex Movements.—Fourteenth week, right hand to right eye (220).

Instinctive Movements.—Fourteenth week, hands hold objects longer and with contra-position of thumb. Fifteenth and sixteenth

weeks, no intentional seizing. One hundred and fourteenth day, ditto (246). Seventeenth week, efforts to take hold of ball; ball moved to mouth and eyes. One hundred and eighteenth day, frequent attempts at seizing; following day, grasping gives pleasure (247). Fourteenth week, head seldom falls forward. Sixteenth week, head held up permanently (264), this the first distinct manifestation of will (265). Fourteenth week, child sits, his back supported (267). Seventeenth week, biting (261).

Imitative Movements.—Fifteenth week, beginnings of imitation; trying to purse the lips (283). Seventeenth week, protruding tip of tongue (284).

Expressive Movements.—Sixteenth week, turnings of head and nodding, not significant; head turned away in refusal (314).

Deliberate Movements.—Fourteenth week, attentive looking at person moving; one hundred and first day, at pendulum swinging (48). Fifteenth week, imitation, pursing lips (283). Sixteenth and seventeenth weeks, voluntary gazing at image in mirror (343).

INTELLECT.

Intellect participates in voluntary movements (I, 338).

Speech.—Fourteenth week, *ntŏ, ha, lŏ, na.* Fifteenth week, *nannana, nā-nā, nanna,* in refusal (103). Sixteenth week, in screaming, *ă-ŭ ă-ŭ ă, ā-ŭ ā-ŭ, ŭ-ă ŭ-ă, ū-ū-ā-ŏ, amme-a;* in discomfort, *ŭă-ŭă-ŭă-ŭă* (104).

Feeling of Self.—Seventeenth week, child gazes at his own hand (193). One hundred and thirteenth day, for the first time regards his image with attention (197). One hundred and sixteenth day, laughs at his image (198).

FIFTH MONTH.

SENSES.

Sight.—*Direction of Look.*—Looking inquiringly (48).

Seeing Near and Distant Objects.—Reaching too short (55).

Hearing.—Nineteenth week, pleasure in sound of crumpling of paper by himself. Twenty-first week, beating of gong enchains attention (85). Disturbed by noise (86).

Touch.—Auditory canal sensitive (106).

Organic Sensations and Emotions.—Pleasure in crumpling paper, tearing newspapers and rolling them into balls, pulling at glove or hair, ringing of a bell (142, 143). Eighteenth week, dis-

comfort shown by depressing angles of mouth (149). Eighteenth week, nights of ten to eleven hours without taking food (155). Eighteenth week, desire shown by stretching out arms (247).

WILL.

Instinctive Movements.—Eighteenth week, objects seized are held firmly and carried to the mouth (247). Nineteenth week, child takes bit of meat and carries to mouth. One hundred and twenty-third day, lips protruded in connection with seizing (248).

INTELLECT.

Speech.—Consonant *k, gö, kö, ăggĕggĕkö.* First five months, screaming sounds *u, ä, ö, a,* with *ü* and *o; m* almost the only consonant (104).

Feeling of Self.—Discovery by child that he can cause sensations of sound (192). Looking at his own fingers very attentively (194).

SIXTH MONTH.

SENSES.

SIGHT.—*Movements of Eyelids.*—Twenty-fifth week, winking caused by puff of wind in face (27).

Interpretation of what is seen.—Child laughs when nodded to by father; observes father's image in mirror, etc. (62).

TASTE.—Medicine taken if sweetened (124). One hundred and fifty-sixth day, child refuses breast, having had sweeter milk. End of twenty-third week, milk of new nurse taken, also cow's milk, meat-broth (125).

ORGANIC SENSATIONS AND EMOTIONS.—Pleasure in grasping increases (142). Arms moved up and down when child is nodded to (144). Twenty-third week, depression of angles of mouth and cry of distress caused by harsh address (149). Hunger apparent in persistent gaze at bottle, crying, and opening of mouth (154). Sleep of six to eight hours (162). Astonishment at seeing father after separation, and at sight of stranger (173).

WILL.

Reflex Movements.—Sneezing caused, on one hundred and seventieth day, by blowing on the child (215).

Instinctive Movements.—Twenty-second week, child raised him-

self to sitting posture (267). Twenty-third week, ditto; pleased at being placed upright (275).

Expressive Movements.—Laugh accompanied by raisings and droppings of arms when pleasure is great (299). Arm-movements that seemed like defensive movements (314). "Crowing" a sign of pleasure (II, 104).

INTELLECT.

Use of means to cause flow of milk (12).

Speech.—Twenty-second week, *ögö, ma-ŏ-ĕ, hă, ā, ho-ich.* "Crowing" and aspirate *ha*, and *brrr-há*, signs of pleasure (104). So *aja, örrgö, ā-ā-i-ŏ-ā, eu* and *oeu* (French) and *ä* and *ö* (German), also *ijä; i* and *u* rare (105).

Feeling of Self.—Twenty-third week, discrimination between touch of self and of foreign object (194; I, 109). Twenty-fourth week, child gazes at glove and at his fingers alternately (194). Twenty fourth week, sees father's image in mirror and turns to look at father. Twenty-fifth week, stretches hand toward his own image. Twenty-sixth week, sees image of father and compares it with original (198).

SEVENTH MONTH.

SENSES.

Sight.—*Movements of Eyelids.*—End of seventh month, opening and shutting of fan causes opening and shutting of eyes (30).

Direction of Look.—Twenty-ninth week, looking at flying sparrow (48). Thirtieth week, child does not look after objects let fall (49).

Seeing Near and Distant Objects.—Accommodation is perfect (55).

Interpretation of what is seen.—Staring at strange face (62).

Hearing.—Gaze at person singing; joy in military music (86).

Feeling.—Child became pale in bath (115).

Taste.—New tastes cause play of countenance (124). One hundred and eighty-fifth day, cow's milk boiled, with egg, is liked; leguminous food not (125).

Organic Sensations and Emotions.—Pleasure in his image in mirror (142). Child laughs when others laugh to him (145). Twenty-ninth week, crying with hunger; spreading out tongue (153). Satiety shown by thrusting mouth-piece out (157).

WILL.

Impulsive Movements. — Nose becomes mobile. Babes strike about them vigorously (207).

Reflex Movements.—Sighing appears (216).

Instinctive Movements.—Thirtieth week, seizing more perfect (249). Child places himself upright on lap, twenty-eighth week (275).

Imitative Movements.—Imitation of movements of head; of pursing lips (283).

Expressive Movements.—Averting head as sign of refusal; thrusting nipple out of mouth (313, 314). Astonishment shown by open mouth and eyes (55).

INTELLECT.

Child did not recognize nurse after absence of four weeks (7); but children distinguish faces before thirtieth week (6).

Speech.—When hungry, child screams *mä, ä, ŭä, ŭäĕ;* when contented, says *örrö; lä, ŭ-ä-ŭ-i-i ; t* seldom, *k* only in yawning, *p* very rarely (106).

EIGHTH MONTH.

SENSES.

Sight.—*Movements of Eyelids.*—Brow not wrinkled invariably in looking upward (24). Play of lid on hearing new noises; no lifting of eyebrows (30, 31). Thirty-fourth week, eyes opened wide with longing (31).

Direction of Look.—Thirty-first week, gaze turned in direction of falling object. Thirty-third week, objects moved slowly downward are followed with close gaze. Thirty-fourth week, objects let fall by him are seldom looked after (49).

Interpretation of what is seen.—Interest in bottles (62).

Hearing.—Quick closing of lids at new impressions of sound (86).

Taste.—Pleasure in the "prepared food" (125).

Organic Sensations and Emotions.—Discomfort accompanied by square form of the mouth (149). Craving for food shown by cooing sound (155). Strongest feeling connected with appeasing of hunger (157). Restless nights (162). Astonishment at new sounds and sights; with fright (86). Thirty-first week, at clapping of fan. Thirty-fourth week, at imitation of voices of animals (173).

WILL.

Impulsive Movements.—Accompanying movement of hand (210). Thirty-fourth week, stretchings of arms and legs accompanying utterance (II, 108).

Instinctive Movements.—Thirty-second week, seizing with both hands more perfect; attention more active (248). In same week, legs stretched up vertically, feet observed attentively, toes carried to mouth with the hands (249). Pulling objects to him; grasping at bottle (250). Thirty-fourth week, carrying things to mouth (251).

Expressive Movements.—Laugh begins to be persistently loud (299). Thirty-second week, child no longer sucks at lips when he is kissed, but licks them (305). Eyelid half closed in disinclination (315). Interest in objects shown by stretching out hands (321).

INTELLECT.

Speech.—Variety of sounds made in the first eight months at random (76). Concept of bottle before language (79). Sounds in screaming different (106). Once the sound *hā-upp;* frequently *a-e͡i, a-a͡u, ă-ha͡u-ă, hŏrrŏ.* Also *ntĕ-ŏ, mi-ja mija;* once *oŭāĕi* (107).

FEELING OF SELF.—Thirty-second week, child looks at his legs and feet as if they were foreign to him (194).

NINTH MONTH.

SENSES.

SIGHT.—*Movements of Eyes.*—Eyes converged easily (38).

Direction of Look.—Thirty-sixth week, objects that fall are not regularly looked after, but slowly moving objects, e. g., tobacco-smoke, are followed (49).

Interpretation of what is seen.—Boxes are gazed at (62). More interest shown in things in general (63).

HEARING.—Winking and starting at slamming noise (86).

TASTE.—Yolk of egg with cane-sugar taken with expression of surprise. Water and bread liked (126).

ORGANIC SENSATIONS AND EMOTIONS.—Striking hands together and laughing for joy (145). Eyes shut when something disagreeable is to be endured; head turned away also (148). Cooing, as in eighth month (155). Fear of dog (167, 168).

WILL.

Reflex Movements.—Number of respirations (in fever) forty and forty-two in a minute (217).

Instinctive Movements.—Teeth-grinding (262). Turning over when laid face downward (266). Thirty-fifth week, child places himself on arm and hand of nurse, and looks over her shoulder (275). Thirty-ninth week, likes to sit with support (267). Thirty-ninth week, stands on feet a moment without support (269).

Expressive Movements.—Loud laughing at new, pleasing objects (299). Turns head to light when asked where it is (321).

Deliberate Movements.—Things brought to mouth are put quickly on tongue (329).

INTELLECT.

Question understood before child can speak (I, 321).

Speech.—Voice more modulated: screaming varies with different causes (107). Delight shown by crowing sounds: *mä-mä, ämmä, mä*, are expressions of pleasure; *ā-au-ā-ā, ā-ŏ, a-u-au, na-na; apa, ga-au-ă, acha* (108).

Feeling of Self.—Feet are felt of, and toes are carried to mouth (190). Thirty-fifth week, foot grasped and carried to mouth. Thirty-sixth week, other objects preferred to hands and feet. Thirty-ninth week, in the bath his own skin is looked at and felt of, also his legs (194). Thirty-fifth week, his image in mirror is grasped at gayly (198).

TENTH MONTH.

SENSES.

Sight.—*Movements of Eyelids.*—Brow invariably wrinkled at looking upward (24).

Movements of Eyes.—Convergence of lines of vision disturbed (38).

Direction of Look.—Forty-third week, objects thrown down are looked at (49).

Interpretation of what is seen.—Visual impressions connected with food best interpreted (63).

Hearing.—Head turned at noise (87).

Organic Sensations and Emotions.—Joy at lighting of lamp (145).

WILL.

Reflex Movements.—Inhibition of reflex (229).

Instinctive Movements.—Forty-third week, carrying objects to mouth (252). Taking a hair from one hand into the other (253). Finger bitten (261). Bread crunched and swallowed (262). Turning over when laid on face (266). Fortieth and forty-first weeks, trying to sit without support (267). Forty-second week, sitting up without support in bath and carriage (267, 268). Forty-first week, first attempts at walking (275). Forty-second week, moving feet forward and sidewise; inclination to walk. Forty-third week, foot lifted high; moving forward (276).

Imitative Movements.—Beckoning imitated (285).

Expressive Movements.—Laughing becomes more conscious and intelligent (299). Crying in sleep (308). Striking hands together in sleep (319). Object pointed at is carried to mouth and chewed (322). Body straightened in anger (324). This not intentional (326).

INTELLECT.

Forty-third week, knowledge of weight of bodies (I, 50). A child missed his parents when they were absent, also a single nine-pin of a set (7, 8).

Speech.—Child can not repeat a syllable heard (77). In monologue, syllables are more distinct, loud, and varied when child is left to himself than when other persons entertain him: *ndăĕ, băĕ-băĕ, ha ell, arrö.* Frequent are *mă, pappa, tatta, appapa, babba, tătă, pa, rrrr, rrra.* Hints at imitation (108).

Feeling of Self.—Forty-first week, striking his own body and foreign objects (191). Forty-first to forty-fourth week, image in mirror laughed at and grasped at (198).

ELEVENTH MONTH.

SENSES.

SIGHT.—*Direction of Look.*—Forty-seventh week, child throws down objects and looks after them (49).

Seeing Near and Distant Objects.—Forty-fourth week, new objects no longer carried to eyes, but gazed at and felt. Forty-seventh week, accommodation perfect (55).

Interpretation of what is seen.—Trying to fixate objects (63).

HEARING.—Screaming is quieted by a "Sh!" or by singing.

Three hundred and nineteenth day, difference in sound of spoon on plate when plate was touched by hand (87).

TASTE.—Meat-broth with egg taken; scalded skimmed milk rejected; dry biscuit liked (126).

ORGANIC SENSATIONS AND EMOTIONS.—Forty-fourth week, astonishment at strange face (173).

WILL.

Instinctive Movements.—Forty-fifth week, grasping at flame of lamp; forty-seventh, at objects behind a pane of glass; gain in moving muscles of arm; shreds of paper handled (252). Biting father's hand (261). Smacking lips (262). Sitting becomes habit for life (268). Standing without support; stamping; but standing only for a moment (269). End of forty-seventh week, feet well placed, but lifted too high and put down too hard (276).

Expressive Movements.—Grasping at his image with laugh; jubilant noise at being allowed to walk (299).

Deliberate Movements.—Striking spoon against object and exchanging objects (326, 327). Child takes biscuit, carries it to mouth, bites off a bit, chews and swallows it; but can not drink from glass (329).

INTELLECT.

Syllables correctly repeated; intentional sound-imitation on the three hundred and twenty-ninth day. Forty-fifth week, response made for diversion: whispering begins (109). Three kinds of *r*-sounds: new syllables, *ta-hêe*, *dann-tee*, *âa-nêe*, *ngä*, *tai*, *bä*, *dall*, *at-tall*, *kamm*, *akkee*, *praï-jer*, *tra*, *ā-hêe*. Some earlier sounds frequent; consonants *b*, *p*, *t*, *d*, *m*, *n*, *r*; *l*, *g*, *k*: vowel *a* most used, *u* and *o* rare, *i* very rare (110). Accentuation not frequent (111). Association of idea with utterance in one case (111, 122). Forty-fifth week, to word "papa," response *rrra* (113).

Feeling of Self.—Forty-fifth to fifty-fifth week, discovery of his power to cause changes (192).

TWELFTH MONTH.

SENSES.

SIGHT.—*Seeing Near and Distant Objects.*—Fifty-first week, pleasure in seeing men sawing wood at distance of more than one hundred feet (55).

HEARING.—Screaming quieted by "Sh!" (87). Three hundred

and sixty-third day, hears noise in next room and looks in direction of sound (88).

Taste.—Fastidious about food (126).

Organic Sensations and Emotions.—Grunting as indication of pleasure (144). Fifty-second week, astonishment at new sound (173).

WILL.

Impulsive Movements.—Accompanying movement of hand in drinking (209).

Instinctive Movements.—Child seized father's hand, carried it to mouth and bit it (261). Forty-eighth week, standing without support a moment; stamping; pushing a chair (276). Forty-ninth week, child can not raise himself without help or stand more than an instant. Fiftieth week, can not place himself on his feet, or walk without help (277).

Imitative Movements.—Trying to strike with spoon on tumbler; puffing repeated in sleep (287).

Expressive Movements.—End of year, imitative laughing; crowing (299). Laughing in sleep (300). Opening of mouth in kissing (305). Arms stretched out in desire (322).

Deliberate Movements.—Biscuit put into mouth with few failures; drinking from glass, breathing into the water (329).

INTELLECT.

Ideas gained before language (78). Logical activity applied to perceptions of sound (I, 88). Abstraction, whiteness of milk (18).

Speech.—Imitation more successful, but seldom correct. Articulate sounds made spontaneously: *haja, jajajajaja, aja, njaja, naïn-hopp, ha-a, pa-a, dēwär, han-na, mömma, allda, alldaï, apa-u-a, gägä, ka, ladn; atta* is varied, no more *dada; w* for the first time. Ability to discriminate between words (112). Fifty-second week, child of himself obeys command, "Give the hand!" Quieting effect of sounds "sh, ss, st, pst" (113).

Feeling of Self.—Striking hard substances against teeth; gnashing teeth (189). Tearing of paper continued (192).

THIRTEENTH MONTH.

SENSES.

Hearing.—Child strikes on keys of piano; pleased with singing of canary-bird (89).

Organic Sensations and Emotions.—Laughing almost invariably follows the laugh of others (145). Sleep, fourteen hours daily (162).

WILL.

Instinctive Movements.—Standing some moments without support (270). Fifty-third week, creeping. Fifty-fourth week, walking, with support; movements in creeping asymmetrical (277).

Expressive Movements.—No idea of kissing (305). Shaking head in denial (315). Begging sound along with extending of hands in desire (323).

INTELLECT.

Trying door after shutting it (15, 16). Hears the vowel-sounds in word (68).

Speech.—Desire expressed by *ä-na*, *ä-nananana* (112). Awkwardness continues; attention more lively. Tries to repeat words said for him. Three hundred and sixty-ninth day, *papa* repeated correctly (113, 114). Syllables most frequent, *nja*, *njan*, *dada*, *atta*, *mama*, *papaï*, *attaï*, *na-na-na*, *hatta*, *meenĕ-meenĕ-meenĕ*, *mömm*, *mömma*, *ao-u*: *na-na* denotes desire, *mama*, mother. Fifty-fourth week, joy expressed by crowing, some very high tones; first distinct *s*, three hundred and sixty-eighth day (114). Understanding of words spoken (115). Confusion of associations; first conscious act of obedience (116).

Feeling of Self.—Rapping head with hand (191). Finding himself a cause; shaking keys, etc. (192). Fifty-fifth week, strikes himself and observes his hands; compares fingers of others with his own (195).

FOURTEENTH MONTH.

SENSES.

Sight.—*Seeing Near and Distant Objects.*—Fifty-eighth week, grasping at lamp above him (55).

Organic Sensations and Emotions.—Fear of falling (169). Fifty eighth week, astonishment at lantern (173).

WILL.

Instinctive Movements.—Child could be allowed to bite paper to pieces; he took the pieces out of his mouth (253). Fifty-seventh week, he hitches along on hands and knees; can not walk without support. Sixtieth week, raises himself by chair (277).

Imitative Movements.—For imitating swinging of arms an interval of time was required (287). Coughing imitated (288). Nodding not imitated (315).

Expressive Movements.—Confounding of movements (322). Affection shown by laying hand on face and shoulders of others (324).

Deliberate Movements.—Child takes off and puts on the cover of a can seventy-nine times (328).

INTELLECT.

Wrong understanding of what is heard (89).

Speech.—No doubt that *atta* means "going"; *brrr*, practiced and perfected; *dakkn, daggn, taggn, attagn, attatn;* no special success in repeating vowels and syllables (117). Child tries and laughs at his failures, if others laugh; parrot-like repetition of some syllables (118). Gain in understanding of words heard; association of definite object with name (119). More movements executed on hearing words (120). Confounding of movements occurs, but grows rare; begging attitude seen to be useful (121).

Feeling of Self.—Four hundred and ninth day, child bit himself on the arm (189). Pulling out and pushing in a drawer, turning leaves of book, etc. (192). Fifty-seventh week, child looks at his image in hand-mirror, puts hand behind glass, etc. (198). Fifty-eighth week, his photograph treated in like manner; he turns away from his image in mirror; sixtieth week, recognizes his mother's image in mirror as image (199).

FIFTEENTH MONTH.

SENSES.

SIGHT.—*Direction of Look.*—Sixty-third to sixty-fifth week, objects thrown down and looked after (50).

Interpretation of what is seen.—Grasps at candle, puts hand into flame, but once only (63).

HEARING.—Laughing at new noises, as gurgling or thunder (89).

SMELL.—Coffee and cologne make no impression till end of month (134).

WILL.

Instinctive Movements.—Sixty-second week, child stands a few seconds when support is withdrawn. Sixty-third week, walks, hold-

ing on to a support (277). Sixty-fourth week, can walk without support, if he thinks he is supported; sixty-fifth week, walks holding by one finger of another's hand; raises himself to knees, stands up if he can hold to something (278).

Imitative Movements.—Coughing. Learns to blow out candle (288). Opening and shutting of hand (289).

Expressive Movements.—Laughing at new sounds (299). The words "Give a kiss" produce a drawing near of head and protruding of lips (306). Wrinkling of brow in attempts at imitation (310). Deprecating movement of arm (314). Sixty-fourth week, nodding sometimes accompanies the word "no"; four hundred and forty-fifth day, an accompanying movement (316). First shrugging of shoulders (317). Begging gesture made by child when he wants something (318). Same made in asking for amusement (319). Wish expressed by handing a ring, looking at glasses to be struck, and saying *hay-ŭh* (323).

INTELLECT.

Hunting for scraps of paper, etc. (17). After burning his finger in flame of candle, the child never put it near the flame again, but would, in fun, put it in the direction of the candle. He allowed mouth and chin to be wiped without crying (20).

Speech.—New sound *wa;* astonishment expressed by *hā-ā-ĕā-ĕ*, joy by crowing in high and prolonged tones, strong desire by *hāō*, *hā-ĕ*, pain, impatience, by screaming in vowels passing over into one another (121). The *atta* still used when a light is dimmed (122). Advance in repeating syllables. Child is vexed when he can not repeat a word. One new word, *heiss* (hot) (123). The *s* is distinct; *th* (Eng.) appears; *w;* smacking in sixty-fifth week; tongue the favorite plaything (124). Understands words "moon," "clock," "eye," "nose," "cough," "blow," "kick," "light"; affirmative nod at "ja" in sixty-fourth week; negative shaking at "no"; holding out hand at words "Give the hand" or "hand"; more time required when child is not well (125).

Feeling of Self.—Child bit his finger so that he cried out with pain (191). Sixty-second week, playing with his fingers as foreign objects; pressing one hand down with the other (195). Sixty-first week, trying to feel of his own image in the mirror (199).

SIXTEENTH MONTH.

SENSES.

SIGHT.—*Seeing Near and Distant Objects.*—Sixty-eighth week, reaching too short, too far to left or right, too high or too low (56), *Interpretation of what is seen.*—Grasping at jets of water (63).

HEARING.—Child holds watch to his ear and listens to the ticking (89).

SMELL.—Smell and taste not separated; a flower is taken into mouth (135).

ORGANIC SENSATIONS AND EMOTIONS.—Fear of high tones (169).

WILL.

Impulsive Movements.—Sleeping child raised hand to eye (202). Accompanying movement of fingers in drinking (210).

Reflex Movements.—Respirations, in sleep, twenty-two to twenty-five a minute (217).

Instinctive Movements.—Sixty-sixth week, four hundred and fifty-seventh day, child runs alone (278). Next day, stops and stamps. Four hundred and sixty-first day, can walk backward, if led, and can turn round alone. At the end of the week can look at objects while walking. Sixty-seventh week, a fall occurs rarely. Sixty-eighth week, walking becoming mechanical (279).

Imitative Movements.—A ring put on his head in imitation (289). Waiting attitude (318).

Expressive Movements.—Lips protruded almost like a snout (302). Shaking head meant "No" and "I do not know" (316). Child shrugs shoulders when unable to answer (317). Waiting attitude becomes a sign (318).

Deliberate Movements.—Opening and shutting cupboards, bringing objects, etc. Holding ear-ring to ear (327).

INTELLECT.

Child holds an ear-ring to his ear with understanding (I, 327). A begging movement at seeing box from which cake had come (11). Small understanding shown in grasping at ring (13).

Speech.—Progress in repeating words spoken for him and in understanding words heard. Desire expressed by *hă! hă-ŏ! hă-ĕ! hĕ-ĕ!* More seldom *hi*, *gŏ-gŏ*, *gŏ*, *f-pa*, *a͡u;* more frequently, *ta*, *dokkn*, *tá-ha*, *a-bwa-bwa*, *bŭă-bŭă;* once *dagon*. Child "reads" the newspaper (126). Pain expressed by screaming; joy by crowing

with vowel *i;* *a* repeated on command; *mŏ* and *ma;* imitation tried (127). Touches eye, ear, etc., when these are named—not with certainty (128). Understands "bring," "give," etc. (129).

Feeling of Self.—Putting thumbs against the head and pushing, experimenting (191). Sixty-sixth week, child strikes at his image in mirror. Sixty-seventh week, makes grimaces before mirror; turns round to see his father, whose image appeared in mirror (199). Sixty-ninth week, signs of vanity (200).

SEVENTEENTH MONTH.

SENSES.

Sight.—*Interpretation of what is seen.*—Child grasps at tobacco-smoke (64).

Hearing.—Holding watch to ear (89).

Taste.—Surprise at new tastes (119).

Smell.—Inability to separate smell and taste (135).

Organic Sensations and Emotions.—Prolonged sleep; ten hours at a time (162).

WILL.

Reflex Movements.—Right hand moved when right nostril is touched (221).

Instinctive Movements.—Clasping of finger in sleep (243). Seventieth week, child raises himself from floor alone; seventy-first week, steps over threshold (279).

Expressive Movements.—Shaking head means "I do not wish" (316). Throwing himself on floor and screaming with rage (323).

INTELLECT.

Child brings traveling-bag to stand upon in order to reach (12). Play of "hide and seek" (17).

Speech.—Screaming, whimpering, etc. (101). Increase of discrimination: *bibi, nä-nä-nä, t-tó, hŏt-tó;* voluntary imitation (129). Associations of words heard with objects and movements (130).

Feeling of Self.—Making grimaces before mirror (200).

EIGHTEENTH MONTH.

SENSES.

Sight.—*Direction of Look.*—Seventy-eighth week, throwing away of playthings is rare (50).

Interpretation of what is seen.—Anxiety on seeing man dressed in black (64).

Smell.—Objects no longer carried to mouth (135).

Organic Sensations and Emotions.—Laughing at thunder (170).

WILL.

Impulsive Movements.—Holding little finger apart from others (209).

Instinctive Movements.—Walks over threshold by holding on (275). Seventy-seventh week, runs around table; seventy-eighth, walks over threshold without holding on (280).

Imitative Movements.—Blowing horn (290).

Expressive Movements.—Trying to hit with foot, striking, etc. (315). Waiting attitude (318).

Deliberate Movements.—Full spoon carried to mouth with skill (329).

INTELLECT.

Memory of towel (8). Watering flowers with empty pot (16). Plays (17). Giving leaves to stag, etc. (18). Stick of wood put in stove (20).

Speech.—Understanding of words increases (130). Repeating of syllables is rare; *atta* becomes *tto*, *t-tu*, *ftu*; feeling recognized by tone of voice (131).

Feeling of Self.—Recognition of himself as cause of changes (192).

NINETEENTH MONTH.

SENSES.

Hearing.—Hearing watch on his head (89).

Organic Sensations and Emotions.—Fear of strangers ceases (150). Laugh at thunder and lightning (170).

WILL.

Imitative Movements. — Combing and brushing hair, washing hands, etc. (290).

Expressive Movements.—Fastidious about kissing (306). Pride in baby-carriage (324).

Deliberative Movements.—Spoon taken in left hand (329).

INTELLECT.

Father recognized after absence (8). Bringing cloth for wrap and begging for door to be opened (12). Grunting in order to be taken away (13). Induction, watch and clock (18). Crying seen to be useless (20).

Speech.—Imitation of whistle (91). Spontaneous sound imitations more frequent (131). Gazing after objects thrown and whispering, reading newspaper (132). Response to *pa* correctly given (133). Objects correctly pointed out; memory of tricks (134).

Feeling of Self.—Attempt to give his foot (190).

TWENTIETH MONTH.

SENSES.

SIGHT.—*Discrimination of Colors.*—First color-tests. Eighty-fifth week, no discrimination (7). Eighty-sixth and eighty-seventh weeks, no results (8).

Movements of the Eyes.—Readiness of convergence, pupils very wide open (38).

ORGANIC SENSATIONS AND EMOTIONS.—Prolonged sleep habitual, etc. (163).

WILL.

Reflex Movements.—Respirations twenty-two and more (217).

Instinctive Movements.—Eighty-fifth week, thresholds stepped over quickly; inclines forward in running (280).

Imitative Movements.—Use of comb and brush, putting on collar (290). Scraping feet, putting pencil to mouth, marking on paper (291).

Expressive Movements.—Proximity essential in kissing; bends head when "kiss" is said (306). Antipathy expressed by turning head at approach of women in black (315).

Deliberate Movements.—Carries spoon with food to mouth cleverly (329).

INTELLECT.

As in nineteenth month, grunting (12, 13).

Speech. — *Rodi, otto, rojo* (93). Understanding of the word "other" (128, 129). Five hundred and eighty-fourth day, important advance in repeating words said (135). Imagination; can not

repeat three syllables; laughs when others laugh (136). Single words more promptly understood (137). One new concept, expressed by *dā* and *ndā*, or *tā* and *ntā*. Eighty-seventh week, *attah* said on railway-train; *papa* and *bät* or *bit* (for "bitte") rightly used; much outcry (138). Crowing tones not so high; loud readings continued (139).

TWENTY-FIRST MONTH.

SENSES.

HEARING.—Dancing not rhythmical (89, 90).

ORGANIC SENSATIONS AND EMOTIONS.—Fear of the sea (170).

WILL.

Instinctive Movements.—Eighty-ninth week, running is awkward, but falling rare (280).

Imitative Movements.—Imitation without understanding (290, 291).

Expressive Movements.—Ninetieth week, pointing as expression of wish (321).

INTELLECT.

Recognition of father (8). Association of biscuit with coat and wardrobe (11).

Speech.—Imitations more frequent. Eighty-ninth week, babbling different, more *consonants; ptö-ptö, pt-pt*, and *verlapp*, also *dla-dla;* willfulness shown in articulate sounds and shaking head (139). Unlike syllables not repeated, *dang-gee* and *dank-kee;* tendency to doubling syllables, *tete, bibi;* babbling yields great pleasure; *bibi* for "bitte" rightly used. New word *mimi*, when hungry or thirsty (140). Understands use and signification of sound, *neinein;* and answers of his own accord *jaja* to question in ninety-first week. Strength of memory for sounds; points correctly to nose, mouth, etc. (141). Astonishing progress in understanding what is said. Few expressions of his own with recognizable meaning, *jäě* excepted. *Att, att, att*, unintelligible. Tried to imitate sound of steam of locomotive (142).

Feeling of Self.—Placing shells and buttons in rows (193). Puts lace about him; vanity; laughs and points at his own image in mirror (200). The same on six hundred and twentieth day (201).

TWENTY-SECOND MONTH.

SENSES.

SIGHT.—New impressions enchain attention; the mysterious more attractive (64).

INTELLECT.

Speech. Progress in understanding; orders executed with surprising accuracy (142). Strength of word-memory; facility of articulation; spontaneous utterance of *pss, ps, ptsch, pth; pa-ptl-dă-pt;* greeting with *hää-ö, ada* and *ana.* Singing, *rollo, mama, mämä,* etc. More certainty in reproducing sounds: "pst, anna, otto, lina," etc. Three-syllabled words correctly repeated, *a-ma-ma, a-pa-pa* (143). Words too hard are given back with *tapĕta, pĕta, pta, ptö-ptö* or *rateratetat. Ja ja* and *nein nein,* with *da* and *bibi* and *mimi,* used properly in request. Cry of pain a strong contrast with the crowing for joy (144).

TWENTY-THIRD MONTH.

SENSES.

SIGHT.—*Seeing Near and Distant Objects.*—Ninety-sixth week, does not appreciate distance (56).

WILL.

Imitative Movements.—Imitative impulse seems like ambition; ceremonious movements imitated (291).

Expressive Movements.—Kiss given as a mark of favor (306). Striking hands together in applause and desire for repetition (319). Tears of sorrow instead of anger; tries to move chair to table, etc. (324).

INTELLECT.

Joy at seeing playthings after absence of eleven and a half weeks (8). Concept of "cup" not sharply defined (16). Use of adjective for the first spoken judgment (96).

Speech.—Heiss (hot) means "The drink is too hot," and "the stove is hot" (144). *Watja* and *mimi; mimmi, mömö, mämä,* mean food; *atta,* disappearance; spontaneous articulation, *o͡i, e͡u, ana, ida, didl, dadl, dldo-dlda;* in singing-tone, *opojö, apojopojum aui, heissa;* calls grandparents *e-papa* and *e-mama;* knows who is meant when these are spoken of. Understands words more easily, as "drink, eat, shut, open" (145). Word-memory becoming firm; imagination.

Great progress in reproducing syllables and words (146). Child's name, "Axel," is called *Aje, Eja.* "Bett, Karre, Kuk," repeated correctly. Echolalia reappears (147). Words are best pronounced by child when he is not called upon to do it (148).

Feeling of Self.—Child holds biscuit to his toes (190).

TWENTY-FOURTH MONTH.

SENSES.

SIGHT.—*Interpretation of what is seen.*—Moving animals closely observed (64).

HEARING.—Trying to sing, and beating time (90).

ORGANIC SENSATIONS AND EMOTIONS.—Astonishment more seldom apparent (174).

WILL.

Instinctive Movements.—Child turns, of himself, dancing in time to music; beats time (280).

Imitative Movements.—Ceremonious movements imitated, salutation, uncovering head (291).

Expressive Movements.—Roguish laughing first observed (299).

INTELLECT.

Understanding of actions and of use of utensils more developed than ability to interpret representations of them (I, 64, 65).

Speech.—Voluntary sound-imitations gain in frequency and accuracy; genuine echolalia (148). Imperfect imitations (149). Multiplicity of meanings in the same utterance (150). Distinguishing men from women. Combination of two words into a sentence, seven hundred and seventh day; words confounded; also gestures and movements; but not in the expression of joy and grief (151, 152).

TWENTY-FIFTH MONTH.

SENSES.

SIGHT.—*Discrimination of Colors.*—Color-tests, red and green; seven hundred and fifty-eighth day, eleven times right, six wrong; seven hundred and fifty-ninth, seven right, five wrong; seven hundred and sixtieth, nine right, five wrong (8). Does not yet *know* what blue and green signify. Moves and handles himself well in twilight (21).

Seeing Near and Distant Objects.—One hundred and eighth week, power of accommodation good; small photographic likenesses recognized (56).

INTELLECT.

Speech.—Progress is extraordinary. Does not pronounce a perfect "u." All sound-imitations more manifold, etc.; begins saying "*so*" when any object is brought to appointed place (152). Has become more teachable, repeats three words imperfectly. Evidence of progress of memory, understanding and articulation in answers given. No word invented by himself; calls his nurse *wolá*, probably from the often-heard "ja wohl." Correct use of single words picked up increases surprisingly (153). Misunderstandings rational; words better understood; reasoning developed (154). Inductive reasoning. Progress in forming sentences. Sentence of five words. Pronouns signify objects or qualities (155, 156).

TWENTY-SIXTH MONTH.

SENSES.

SIGHT.—*Discrimination of Colors.*—Seven hundred and sixty-third day, 15 right, 1 wrong. Three colors pointed out; disinclination to continue (8). Seven hundred and sixty-fifth day, green confounded with yellow. One hundred and tenth week, right 73, wrong 22. Blue added. End of one hundred and tenth week to one hundred and twelfth week, right 124, wrong 36. Yellow more surely recognized than other colors. Violet added (9). Colors taken separately. One hundred and twelfth week, right 44, wrong 11. Tests in both ways; attention not continuous. Gray is added. One hundred and twelfth and one hundred and thirteenth weeks, right 90, wrong 27 (10, 11). Child does not know what "green" means in one hundred and twelfth week (21).

Seeing Near and Distant Objects.—One hundred and thirteenth week, articles of furniture recognized in pictures at distance of three inches or three feet (56).

WILL.

Instinctive Movements.—First attempts at climbing (331).

INTELLECT.

Child points out objects in pictures, and repeats names given to them; list of results (156). Points out of his own accord, with cer-

tainty, in the picture-book. Appropriates many words not taught him, *tola* for "Kohlen," *dals* for "Salz." Others correctly said and used (157). Some of his mutilated words not recognizable; "sch" sometimes left out, sometimes given as *z* or *ss*. Independent thoughts expressed by words more frequently; "Good-night" said to the Christmas-tree (158). Verb used (in the infinitive) showing growth of intellect; learning of tricks decreases (159). No notion of number; does not understand "Thank you," but thanks himself. More names of animals, learned from adults; no onomatopœia (160).

TWENTY-SEVENTH MONTH.

SENSES.

SIGHT.—*Discrimination of Colors.*—Color-tests, from one hundred and fourteenth to one hundred and sixteenth week, four trials, colors mixed; result, 59 right, 22 wrong (11). Blue especially confounded with violet, also with green. Four trials in one hundred and fourteenth and one hundred and fifteenth weeks; result, 58 right, 32 wrong (12). Two trials in one hundred and fifteenth week; result, 25 right, 16 wrong (13).

ORGANIC SENSATIONS AND EMOTIONS. — Uncomfortable feeling through pity; child weeps if human forms cut out of paper are in danger of mutilation (150, 151).

WILL.

Instinctive Movements.—Pleasure in climbing begins (280).

INTELLECT.

Speech. — Activity of thought. Observation and comparison. Gratitude does not appear (161). Wishes expressed by verbs in the infinitive or by substantives. Adverbs; indefinite pronouns. Seven hundred and ninety-sixth day, makes the word *Messen* (162). *Wolà* and *atta* have almost disappeared. Independent applications of words (163). Monologues less frequent. Begs apple to give to a puppet. Echolalia prominent. Tones and noises imitated (164). Laughing when others laugh; fragments of a dialogue repeated. Feeble memory for answers and numbers. Eight hundred and tenth day, gave his own name for first time in answer to a question (165). No question yet asked by the child. The article is not used. Pronunciation slowly becoming correct (166).

TWENTY-EIGHTH MONTH.

SENSES.

SIGHT.—*Discrimination of Colors.*—One hundred and twenty-first week, greater uncertainty (13).

ORGANIC SENSATIONS AND EMOTIONS.—Fear of pigs (168).

WILL.

Instinctive Movements.—Going on all-fours; jumping, climbing gives pleasure (280).

INTELLECT.

Speech.—Rapid increase of activity in forming ideas, and greater certainty in use of words. Ambition; observation and combination; beginning of self-control; use of his own name and of names of parents; independent thinking (167). Increase in number of words correctly pronounced; attempt to use prepositions; first intelligent use of the article (168). Questioning active; first spontaneous question on eight hundred and forty-fifth day. "Where?" is his only interrogative word. Reproduction of foreign expressions (169). Imagination lively; paper cups used like real ones. Articulation better, but still deficient. Many parts of the body named correctly (170). Child makes remarks for a quarter of an hour at a time concerning objects about him, sings, screams in sleep (171).

TWENTY-NINTH MONTH.

SENSES.

SIGHT.—*Discrimination of Colors.*—One hundred and twenty-fourth week, right, 58; wrong, 49. Eight hundred and sixty-eighth day, child takes colors of his own accord and names them; confounding rose, gray, and pale-green, brown and gray, blue and violet. One hundred and twenty-fourth and one hundred and twenty-fifth weeks, right, 80; wrong, 34 (14). Red and yellow generally named rightly; blue and green not. Red and yellow are removed; child is less interested. One hundred and twenty-fifth and one hundred and twenty-sixth weeks, right, 80; wrong, 63. Orange confounded with yellow, blue with violet, green with gray, black with brown. Failure of attempt to induce child to put like colors together, or to select colors by their names (15).

Direction of Look.—One hundred and twenty-fourth week, gaze follows ball thrown (50).

Organic Sensations and Emotions.—Fear of dogs (168).

INTELLECT.

Personal pronoun used in place of his own name. Inflection of verbs appears, but the infinitive is generally used for imperative; regular and irregular verbs begin to be distinguished (171). Desire expressed by infinitive. Numbering active; numerals confounded. Eight hundred and seventy-eighth day, nine-pins counted "one, one, one," etc. (172). Questioning increases; "too much" is confounded with "too little." Yet memory gains (173). Sounds of animals well remembered. Slow progress in articulation (174).

Feeling of Self.—Personal pronoun in place of his own name; "me" but not yet "I" (202).

THIRTIETH MONTH.

SENSES.

Sight.—*Discrimination of Colors.*—One hundred and twenty-sixth, one hundred and twenty-seventh, and one hundred and twenty-eighth weeks, four trials with single color at a time; 75 right, 34 wrong. Eight hundred and ninety-eighth day, every color rightly named; some guessing on blue and green (16).

Interpretation of what is seen. — Persistent desire daily to "write" locomotives (66).

Hearing.—While eating, by chance puts hand to ear while kettle of boiling water stood before him; notices diminution in force of sound (88).

WILL.

Instinctive Movements.—Mounting a staircase without help; ten days later with hands free (280, 281).

INTELLECT.

Speech.—Independent activity of thought. When language fails, he considers well (174). Deliberation without words; concepts formed. Intellectual advance shown in first intentional use of language (175). Only interrogative word is still "Where?" "I" does not appear, but "me" is used. Sentences independently applied

(176). More frequent use of the plural in nouns; of the article; of the strong inflection; auxiliaries omitted or misemployed. Twofold way of learning correct pronunciation (177). Memory for words denoting objects good; right and left confounded (178).

THIRTY-FIRST MONTH.

SENSES.

SIGHT.—*Discrimination of Colors.*—Nine hundred and thirty-fourth day, child says he can not tell green and blue. Green mostly called gray; blue, violet (17).

FEELING.—*Sensibility to Temperature.*—Child laughs joyously in cold bath (115).

WILL.

Weakness of will shown by ceasing to eat when told that he has had enough (344).

INTELLECT.

Speech.—Onomatopœia; imitation of locomotive-whistle (91). Two new questions. Indefinite article more frequent. Individual formations of words, as comparative of "high"; "key-watch." Confounding of "to-day" and "yesterday" (178). Forming of sentences imperfect. Reporting of faults. Calls things "stupid" when he is vexed by them. Changes occupation frequently. Imitation less frequent. Singing in sleep. "Sch" not yet pronounced (179).

Feeling of Self.—Causing change in objects, pouring water into and out of vessels (193). Laughing at image of self in mirror (201).

THIRTY-SECOND MONTH.

SENSES.

SIGHT.—*Discrimination of Colors.*—One hundred and thirty-eighth and a few previous weeks, six trials, child taking colors and naming them; right 119, wrong, 38 (16, 17). Green and blue called "nothing at all." Unknown colors named green; leaves of roses called "nothing," as are whitish colors. One hundred and thirty-eighth and one hundred and thirty-ninth weeks, three trials; right, 93, wrong, 39 (17, 18). Green begins to be rightly named, blue less often (18).

INTELLECT.

Speech.—"I" begins to displace the name of child. Sentence correctly applied. Clauses formed. Particle separated in compound verbs. Longer names and sentences distinctly spoken, but the influence of dialect appears (180). Memory improved, but fastidious; good for what is interesting and intelligible to child (181).

Feeling of Self.—Fourfold designation of self (202).

THIRTY-THIRD MONTH.

SENSES.

SIGHT.—*Discrimination of Colors.*—One hundred and thirty-ninth, one hundred and forty-first, and one hundred and forty-sixth weeks, took colors of his own accord and named them; result of three trials, 66 right, 19 wrong (18).

ORGANIC SENSATIONS AND EMOTIONS.—Fear of even smallest dog (168).

INTELLECT.

Understanding that violations of well-known precepts have unpleasant consequences (21).

Speech.—Strength of memory shown in characteristic remarks Narrative of feeding fowls (181). Interest in animals and other moving objects; lack of clearness in concepts of animal and machine; meaning of word "father" includes also "uncle"; selfhood more sharply manifested. Confounds "too much" with "too little," etc. (182).

Feeling of Self.—"I" especially used in "I want that," etc. (202).

THIRTY-FOURTH MONTH.

SENSES.

SIGHT.—*Discrimination of Colors.*—"Green" rightly applied to leaves and grass (18). Order in which colors are rightly named up to this time; right, one thousand and forty-four; wrong, four hundred and forty-two: right, 70·3 per cent; wrong, 29·7. Yellow and red much sooner named rightly than green and blue (19).

WILL.

Instinctive Movements.—First gymnastic exercises (281).

Expressive Movements.—Kissing an expression of thankfulness (306).

INTELLECT.

Speech.—Repeating, for fun, expressions heard. Calls, without occasion, the name of the nurse; calls others by her name, sometimes correcting himself. Seldom speaks of himself in third person; gradually uses "Du" in address; uses "What?" in a new way. One thousand and twenty-eighth day, "Why?" first used; instinct of causality expressed in language (183). Questioning repeated to weariness. Articulation perfected, with some exceptions (184).

Feeling of Self.—Repeats the "I" heard, meaning by it "you" (202).

THIRTY-FIFTH MONTH.

WILL.

Reflex Movements.—Responsive movement in sleeping child (221).

INTELLECT.

Speech.—Fondness for singing increases; pleasure in compass and power of his voice (185).

THIRTY-SIXTH MONTH.

SENSES.

Hearing.—Musical notes C, D, E, could not be rightly named by child, in spite of teaching (90).

INTELLECT.

"When?" not used until close of the third year (184). Great pleasure in singing, but imitation here not very successful, though surprisingly so in regard to speech. Grammatical errors more rare. Long sentences correctly but slowly formed. Ambition manifested in doing things without help (185).

Invention in language rare. Participles well used (186).

THIRTY-SEVENTH MONTH.

SENSES.

Sight.—*Discrimination of Colors.*—Colors named correctly except very dark or pale ones (21).

Organic Sensations and Emotions.—Night's sleep from eleven to twelve hours; day-naps no longer required (163). Fear (in sleep) of pigs (168).

INTELLECT.

Speech. — Child's manner of speaking approximates more and more rapidly to that of the family (186).

FORTIETH MONTH.

INTELLECT.

Feeling of Self.—Fortieth month, pleased with his shadow (201).

THE MIND OF THE CHILD.

THIRD PART.

DEVELOPMENT OF THE INTELLECT.

The development of the intellect depends in so great measure upon the modification of innate endowments through natural environment and education, even before systematic instruction begins, and the methods of education are so manifold, that it is at present impossible to make a complete exposition of a normal intellectual development. Such an exposition would necessarily comprise in the main two stages:

1. The *combination* of sensuous *impressions* into *perceptions* (Wahrnehmungen); which consists essentially in this—that the sensation, impressing itself directly upon our experience, is by the intellect, now beginning to act, co-ordinate in space and time.

2. The *combination* of *perceptions* into *ideas;* in particular into *sense-intuitions* and *concepts.* A sense-intuition (Anschauung) is a perception together with its cause, the object of the sensation; a concept (Begriff) results from the union of the previously separated perceptions, which are then called separate marks or qualities.

The investigation of each of these stages in the child

is in itself a great labor, which an individual may indeed begin upon, but can not easily carry through uniformly in all directions.

I have indeed tried to collect recorded facts, but have found only very little trustworthy material, and accordingly I confine myself essentially to my own observations on my child. These are not merely perfectly trustworthy, even to the minutest details (I have left out everything of a doubtful character), but they are the most circumstantial ever published in regard to the intellectual development of a child. But I have been acquainted with a sufficient number of other children to be certain that the child observed by me did not *essentially* differ from other healthy and intelligent boys in regard to the principal points, although the time at which development takes place, and the rapidity of it, differ a good deal in different individuals. Girls often appear to learn to speak earlier than boys; but further on they seem to possess a somewhat inferior capacity of development of the logical functions, or to accomplish with less ease abstractions of a higher order; whereas in boys the emotional functions, however lasting their reactions, are not so delicately graduated as in girls.

Without regard to such differences, of which I am fully aware, the following chapters treat exclusively of the development of purely intellectual cerebral activity in both sexes during the first years. I acknowledge, however, that I have found the investigation of the influence of the affectional movements, or emotions, upon the development of the intellect in the child during the first years so difficult, that I do not for the present enter into details concerning it.

The observations relate, first, to the non-dependence of the child's intellect upon language; next, to the acquirement of speech; lastly, to the development of the feeling of self, the "I"-feeling.

CHAPTER XVI.

DEVELOPMENT OF THE CHILD'S INTELLECT INDEPENDENTLY OF LANGUAGE.

A WIDE-SPREAD prejudice declares, "Without language, no understanding"! Subtile distinctions between understanding and reason have limited the statement to the latter term. But even in the restricted form, "Without verbal language, no reason," it is at least unproved.

Is there any thinking without words? The question takes this shape.

Now, for the thinker, who has long since forgotten the time when he himself learned to speak, it is difficult, or even impossible, to give a decided answer. For the thinking person can not admit that he has been thinking without words; not even when he has caught himself arriving at a logical result without a continuity in his unexpressed thought. A break occurred in the train. There was, however, a train of thought. Breaks alone yield no thought; they arise only after words have been associated with thoughts, and so they can by no means serve as evidence of a thinking without words, although the ecstasy of the artist, the profundity of the metaphysician, may attain the last degree of unconsciousness, and a dash may interrupt the thought-text.

But the child not yet acquainted with verbal language, who has not been prematurely artificialized by training and by suppression of his own attempts to express his states of mind, who learns *of himself* to *think*, just as he learns of himself to see and hear—such a child shows plainly to the attentive observer that long before knowledge of the word as a means of understanding among men, and long before the first successful attempt to express himself in articulate words—nay, long before learning the pronunciation of even a single word, he combines ideas in a logical manner—i. e., he *thinks*. Thinking is, it is true, "internal speech," but there is a speech without words.

Facts in proof of this have already been given in connection with other points (Vol. I, pp. 88, 327, 328); others are given further on.

It will not be superfluous, however, to put together several observations relating to the development of the childish intellect without regard to the acquirement of speech; and to present them separately, as a sort of introduction to the investigation of the process of learning to speak.

Memory; a causative combination of the earliest recollections, or memory-images; purposive, deliberate movements for the lessening of individual strain—all these come to the child in greater or less measure independently of verbal language. The, as it were, embryonic logic of the child does not need words. A brief explanation of the operation of these three factors will show this. Memory takes the first place in point of time.

Without memory no intellect is possible. The only

material at the disposal of the intellect is received from the senses. It has been provided solely out of sensations. Now a sensation in itself alone, as a simple fundamental experience affecting primarily the one who has the sensation, can not be the object of any intellectual operation whatever. In order to make such activity possible there must be several sensations: two of different kinds, of unequal strength; or two of different kinds, of the same strength; or two of the same kind unequally strong; in any case, two unlike sensations (cf. my treatise "Elemente der reinen Empfindungslehre," Jena, 1876), if the lowest activity of the intellect, *comparison*, is to operate. But because the sensations that are to be compared can not all exist together, recollection of the earlier ones is necessary (for the comparison); that is, individual or personal memory.

This name I give to the memory formed by means of individual impressions (occurrences, experiences) in contrast with the *phyletic* memory, or instinct, the memory of the race, which results from the inheritance of the traces of individual experiences of ancestors; of this I do not here speak.

All sensations leave traces behind in the brain; weak ones leave such as are easy to be obliterated by others; strong ones, traces more enduring.

At the beginning of life it seems to be the department of taste (sweet) and of smell (smell of milk) in which memory is first operative (Vol. I, p. 124). Then comes the sense of touch (in nursing). Next in order the sense of sight chiefly asserts itself as an early promoter of memory. Hearing does not come till later.

If the infant, in the period from three to six months of age, is brought into a room he has not before seen, his expression changes; he is astonished. The new sensations of light, the different apportionment of light and dark, arouse his attention; and when he comes back to his former surroundings he is not astonished. These have lost the *stimulus of novelty*—i. e., a certain *reminiscence* of them has remained with the child, they have *impressed* themselves upon him.

Long before the thirtieth week, healthy children distinguish human faces definitely from one another; first, the faces of the mother and the nurse, then the face of the father, seen less often; and all three of these from every strange face. Probably faces are the first thing frequently perceived clearly by the eye. It has been found surprising that infants so much earlier recognize human faces and forms, and follow them with the gaze, than they do other objects. But human forms and faces, being large, moving objects, awaken interest more than other objects do; and on account of the manner of their movements, and because they are the source from which the voice issues, are essentially different from other objects in the field of vision. "In these movements they are also characterized as a coherent whole, and the face, as a whitish-reddish patch with the two sparkling eyes, is always a part of this image that will be easy to recognize, even for one who has seen it but a few times" (Helmholtz).

Hence the memory for faces is established earlier than that for other visual impressions, and with this the ability to recognize members of the family. A little girl, who does not speak at all, looks at pictures with

considerable interest in the seventh month, "and points meantime with her little forefinger to the heads of the human figures" (Frau von Strümpell).

My child in the second month could already localize the face and voice of his mother, but the so-called knowing ("Erkennen") is a recognition (Wiedererkennen) which presupposes a very firm *association of the memory-images.* This fundamental function attached to the memory can have but a slow development, because it demands an accumulation of memory-images and precision in them.

In the second three months it is so far developed, at least, that strange faces are at once known as strange, and are distinguished from those of parents and nurse; for they excite astonishment or fear (crying) while the faces of the latter do not. But the latter, if absent, are not yet, at this period, missed by most children. Hence it is worthy of note that a girl in her twelfth month recognized her nurse after six days' absence, immediately, "with sobs of joy," as the mother reports (Frau von Strümpell); another recognized her father, after a separation of four days, even in the tenth month (Lindner).

In the seventh month my child did *not* recognize his nurse, to whom he had for months been accustomed, after an absence of four weeks. Another child, however, at four months noticed at evening the absence of his nurse, who had been gone only a day, and cried lustily upon the discovery, looking all about the room, and crying again every time after searching in vain (Wyma, 1881). At ten months the same child used to be troubled by the absence of his parents, though he

bore himself with indifference toward them when he saw them again. At this period a single nine-pin out of the whole set could not be taken away without his noticing it, and at the age of a year and a half this child knew at once whether one of his ten animals was missing or not. In the nineteenth and twenty-first months my boy recognized his father immediately from a distance, after a separation of several days, and once after two weeks' absence; and in his twenty-third month his joy at seeing again his playthings after an absence of eleven and a half weeks (with his parents) was very lively, great as was the child's forgetfulness in other respects at this period. A favorite toy could often be taken from him without its being noticed or once asked for. But when the child—in his eighteenth month—after having been accustomed to bring to his mother two towels which he would afterward carry back to their place, on one occasion had only one towel given back to him, he came with inquiring look and tone to get the second.

This observation, which is confirmed by some similar ones, proves that at a year and a half the memory for visual and motor ideas that belong together was already well developed without the knowledge of the corresponding words. But artificial associations of this sort need continual renewing, otherwise they are soon forgotten; the remembrance of them is speedily lost even in the years of childhood.

It is noteworthy, in connection with this, that what has been lately acquired, e. g., verses learned by heart, can be recited more fluently during sleep than in the waking condition. At the age of three years and five months a girl recited a stanza of five lines on the occa-

sion of a birthday festival, not without some stumbling, but one night soon after the birthday she repeated the whole of the rhymes aloud in her sleep without stumbling at all (Frau von Strümpell).

It is customary, generally, to assume that the memory of adults does not extend further back than to the fourth year of life. Satisfactory observations on this point are not known to exist. But it is certainly of the first consequence, in regard to the development of the faculty of memory, whether the later experiences of the child have any characteristic in common with the earlier experiences. For many of these experiences no such agreement exists; nothing later on reminds us of the once existing inability to balance the head, or of the former inability to turn around, to sit, to stand, to walk, of the inborn difficulty of hearing, inability to accommodate the eye, and to distinguish our own body from foreign objects; hence, no man, and no child, remembers these states. But this is not true of what is acquired later. My child when less than three years old remembered very well—and would almost make merry over himself at it—the time when he could not yet talk, but articulated incorrectly and went imperfectly through the first, often-repeated performances taught by his nurse, "How tall is the child?" and "Where is the rogue?" If I asked him, after he had said "Frühstücken" correctly, how he used to say it, he would consider, and would require merely a suggestion of accessory circumstances, in order to give the correct answer *Fritick*, and so with many words difficult to pronounce. The child of three and even of four years can remember separate experiences of his second year, and a person that will take

the pains to remind him frequently of them will be able easily to carry the recollections of the second and third years far on into the more advanced years of childhood. It is merely because no one makes such a useless experiment that older children lose the memory-images of their second year. These fade out because they are not combined with new ones.

At what time, however, the first natural association of a particular idea with a new one that appears weeks or months later, takes place without being called up by something in the mean time, is very hard to determine. On this point we must first gather good observations out of the second and third half-years, like the following:

"In the presence of a boy a year and a half old it was related that another boy whom he knew, and who was then in the country far away, had fallen and hurt his knee. No one noticed the child, who was playing as the story was told. After some weeks the one who had fallen came into the room, and the little one in a lively manner ran up to the new-comer and cried, 'Fall, hurt leg!'" (Stiebel, 1865).

Another example is given by G. Lindner (1882): "The mother of a two-year-old child had made for it out of a postal-card a sled (Schlitten), which was destroyed after a few hours, and found its way into the waste-basket. Just four weeks later another postal-card comes, and it is taken from the carrier by the child and handed to the mother with the words, '*Mamma, Litten!*' This was in summer, when there was nothing to remind the child of the sled. Soon after the same wish was expressed on the receipt of a letter also."

I have known like cases of attention, of recollection, and of intelligence in the third year where they were not suspected. The child, unnoticed, hears all sorts of things said, seizes on this or that expression, and weeks after brings into connection, fitly or unfitly, the memory-images, drawing immediately from an insufficient number of particular cases a would-be general conclusion.

Equally certain with this fact is the other, less known or less noticed, that, *even before the first attempts at speaking, such a generalizing and therefore concept-forming combination of memory-images regularly takes place.*

All children in common have inborn in them the ability to combine all sorts of sense-impressions connected with food, when these appear again individually, with one another, or with memory-images of such impressions, so that adaptive movements suited to the obtaining of fresh food arise as the result of this association. In the earlier months these are simple and easier to be seen, and I have given several examples (Vol. I, pp. 250, 260, 329, 333). Later such movements, through the perfecting of the language of gesture and the growth of this very power of association, become more and more complicated: e. g., in his sixteenth month my boy saw a closed box, out of which he had the day before received a cake; he at once made with his hands a begging movement, yet he could not speak a word. In the twenty-first month I took out of the pocket of a coat which was hanging with many others in the wardrobe a biscuit and gave it to the child. When he had eaten it, he went directly to the wardrobe and looked in the right coat for a second biscuit. At this period also the

child can not have been thinking in the unspoken words, "Get biscuit—wardrobe, coat, pocket, look," for he did not yet know the words.

Even in the sixth month an act of remarkable *adaptiveness* was once observed, which can not be called either accidental or entirely voluntary, and if it was fully purposed it would indicate a well-advanced development of understanding in regard to food without knowledge of words. When the child, viz., after considerable experience in nursing at the breast, discovered that the flow of milk was less abundant, he used to place his hand hard on the breast as if he wanted to force out the milk by pressure. Of course there was here no insight into the causal connection, but it is a question whether the firm laying on of the little hand was not repeated for the reason that the experience had been once made accidentally, that after doing this the nursing was less difficult.

On the other hand, an unequivocal complicated act of deliberation occurred in the seventeenth month. The child could not reach his playthings in the cupboard, because it was too high for him; he ran about, brought a traveling-bag, got upon it, and took what he wanted. In this case he could not possibly think in words, since he did not yet know words.

My child tries further (in the nineteenth and twentieth months) in a twofold fashion to make known his eager wish to leave the room, not being as yet able to speak. He takes any cloth he fancies and brings it to me. I put it about him, he wraps himself in it, and, climbing beseechingly on my knee, makes longing, pitiful sounds, which do not cease until after I have opened

a door through which he goes into another room. Then he immediately throws away the cloth and runs about exulting.

The other performance is this : When the child feels the need of relieving his bowels, he is accustomed to make peculiar grunting sounds, by means of a strain of the abdomen, shutting the mouth and breathing loud, by jerks, through the nose. He is then taken away. Now, if he is not suited with the place where he happens to be, at any time, he begins to make just such sounds. If he is taken away, no such need appears at all, but he is in high glee. Here is the expectation, "I shall be taken away if I make that sound."

Whether we are to admit, in addition, an intentional *deception* in this case, or whether only a logical process takes place, I can not decide. In the whole earlier and later behavior of the child there is no ground for the first assumption, and the fact that he employs this artifice while in his carriage, immediately after he has been waited on, is directly against it.

To how small an extent, some time previous to this, perceptions were made use of *to simplify his own exertions*, i. e., were combined and had motor effect, appears from an observation in the sixteenth month. Earlier than this, when I used to say, "Give the ring," I always laid an ivory ring, that was tied to a thread, before the child, on the table. I now said the same thing—after an interval of a week—while the same ring was hanging near the chair by a red thread a foot long, so that the child, as he sat on the chair, could just reach it, but only with much pains. He made a grasp now, upon getting the sound-impression "ring," not at the thread,

which would have made the seizure of the ring, hanging freely, very easy for him, but directly at the ring hanging far below him, and gave it to me. And when the command was repeated, it did not occur to him to touch the thread.

It is likewise a sign of small understanding that the mouth is always opened in smelling of a fragrant flower or perfume (Vol. I, p. 135). Deficiencies of this kind are, indeed, quite logical from the standpoint of childish experience. Because, at an earlier period the pleasant smell (of milk) always came in connection with the pleasant taste, therefore, thinks the child, in every case where there is a pleasant smell there will also be something that tastes good. The common or collective concept *taste-smell* had not yet (in the seventeenth month) been differentiated into the concepts taste and smell.

In the department of the sense of hearing the differentiation generally makes its appearance earlier; memory, as a rule, later. Yet children whose talent for music is developed early, retain *melodies* even in their first year of life. A girl to whom some of the Froebel songs were sung, and who was taught appropriate movements of the hands and feet, always performed the proper movement when one of the melodies was merely hummed, or a verse was said (in the thirteenth month), without confounding them at all. This early and firm association of sound-images with motor-images is possible only when interest is attached to it—i. e., when the attention has been directed often, persistently, and with concentration, upon the things to be combined. Thus, this very child (in the nineteenth month), when her favorite song, "Who will go for a Soldier?" ("Wer will

unter die Soldaten?") was sung to her, could not only join in the rhyme at the end of the verse, but, no matter where a stop was made, she would go on, in a manner imperfect, indeed, but easily intelligible (Frau Dr. Friedemann).

Here, however, in addition to memory and attention, heredity is to be considered; since such a talent is wholly lacking in certain families, but in others exists in all the brothers and sisters.

In performances of this kind, a superior understanding is not by any means exhibited, but a stronger memory and faculty of association. These associations are not, however, of a logical sort, but are habits acquired through training, and they may even retard the development of the intellect if they become numerous. For they may obstruct the formation, at an early period, of independent ideas, merely on account of the time they claim. Often, too, these artificial associations are almost useless for the development of the intellect. They are too special. On this ground I am compelled to censure the extravagancies, that are wide-spread especially in Germany, of the Froebel methods of occupying young children.

The *logic of the child* naturally operates at the beginning with much more extensive, and therefore less intensive, notions than those of adults, with notions which the adult no longer forms. But the child does not, on that account, proceed illogically, although he does proceed awkwardly. Some further examples may illustrate.

The adult does not ordinarily try whether a door that he has just bolted is fast; but the one-year-old

child tests carefully the edge of the door he has shut, to see whether it is really closed, because he does not understand the effect of lock and bolt. For even in the eighteenth month he goes back and forth with a key, to the writing-desk, with the evident purpose of opening it. But at twelve months, when he tries whether it is fast, he does not think of the key at all, and does not yet possess a single word.

An adult, before watering flowers with a watering-pot, will look to see whether there is water in it. The child of a year and a half, who has seen how watering is done, finds special pleasure in going from flower to flower, even with an empty watering-pot, and making the motions of pouring upon each one separately, as if water would really come out. For him the notion "watering-pot" is identical with the notion "filled watering-pot," because at first he was acquainted with the latter only.

Much of what is attributed to imagination in very young children rests essentially on the formation of such vague concepts, on the inability to combine constant qualities into sharply defined concepts. When, in the twenty-third month, the child holds an empty cup to his mouth and sips and swallows, and does it repeatedly, and with a serene, happy expression, this "play" is founded chiefly on the imperfect notion "filled cup." The child has so often perceived something to drink, drinking-vessel, and the act of drinking, in combination with one another, that the one peremptorily demands the other when either appears singly; hence the pleasure in pouring out from empty pitchers into empty cups, and in drinking out of empty cups (in second to

fifth years). When adults do the same in the play of the theatre, this action always has a value as language, it signifies something for other persons; but with the child, who plays in this fashion entirely alone, the pleasure consists in the production of familiar ideas together with agreeable feelings, which are, as it were, crystallized with comparative clearness out of the dull mass of undefined perceptions. These memory-images become real existences, like the hallucinations of the insane, because the sensuous impressions probably impress themselves directly — without reflection — upon the growing brain, and hence the memory-images of them, on account of their vividness, can not always be surely distinguished from the perceptions themselves. Most of the plays that children invent of themselves may be referred to this fact; on the other hand, the play of hide-and-seek (especially in the seventeenth and eighteenth months), and, nearly allied to this, the hunting after scraps of paper, bits of biscuit, buttons, and other favorite objects (in the fifteenth month), constitute an intellectual advance.

By practice in this kind of seeking for well-known, purposely concealed objects, the intelligence of little children can easily be increased to an astonishing degree, so that toward the end of the second year they already understand some simple tricks of the juggler; for example, making a card disappear. But after I had discontinued such exercises for months, the ordinary capacity for being duped was again present.

This ease with which children can be deceived is to be attributed to lack of experience far more than to lack of intelligence. When the child of a year and a

half offers leaves to a sheep or a stag, observes the strange animal with somewhat timid astonishment, and a few days after holds out some hastily plucked grass-blades to a chaffinch he sees hopping across the road, supposing that the bird will likewise take them from his hand and eat them—an observation that I made on my child exactly as Sigismund did on his—it is not right to call such an act "stupid"; the act shows ignorance—i. e., inexperience—but it is not illogical. The child would be properly called stupid only in case he did not *learn* the difference between the animals fed. When, on the other hand, the child of two and a half years, entirely of his own accord, holds a watch first to his left ear, then to his right, listens both times, and then says, "The watch goes, goes too!" then, pointing with his finger to a clock, cries with delight, "The clock goes too," we rightly find in such independent induction a proof of intellect. For the swinging of the pendulum and the ticking had indeed often been perceived, but to connect the notion of a "going clock" with the visible but noiseless swinging, just as with the audible but invisible ticking of the watch, requires a pretty well advanced power of abstraction.

That the ability to *abstract* may show itself, though imperfectly, even in the first year, is, according to my observations, certain. Infants are struck by a quality of an object—e. g., the white appearance of milk. The "taking away" or "abstracting" then consists in the isolating of this quality out of innumerable other sight-impressions and the blending of the impressions into a concept. The *naming* of this, which begins months later, by a rudimental word, like *mum*, is an outward

sign of this abstraction, which did not at all lead to the formation of the concept, but followed it, as will be shown in detail further on (in the two following chapters).

It would be interesting to collect observations concerning this reasoning power in the very earliest period, because at that time language does not interfere to help or to hinder. But it is just such observations that we especially lack. When a child in the twelfth month, on hearing a watch for the first time, cries out, "Tick-tick," looking meantime at the clock on the wall, he has not, in doing this, "formed," as G. Lindner supposes, "his first concept, although a vague and empty one as yet," but he had the concept before, and has now merely given a name to it for the first time.

The first observation made in regard to his child by Darwin, which seemed to him to prove "a sort of practical reflection," occurred on the one hundred and forty-fourth day. The child grasped his father's finger and drew it to his mouth, but his own hand prevented him from sucking the finger. The child then, strangely enough, instead of entirely withdrawing his hand, slipped it along the finger so that he could get the end of the finger into his mouth. This proceeding was several times repeated, and was evidently not accidental but intentional. At the age of five months, associations of ideas arose independently of all instruction. Thus, e. g., the child, being dressed in hat and cloak, was very angry if he was not at once taken out of doors.

How strong the *reasoning power without* words may be at a later period, the following additional observations show:

From the time when my child, like Sigismund's (both in the fifteenth month), had burned his finger in the flame of the candle, he could not be induced to put his finger near the flame again, but he would sometimes put it in fun toward the flame without touching it, and he even (eighteen months old) carried a stick of wood of his own accord to the stove-door and pushed it in through the open slide, with a proud look at his parents. There is surely something more than an imitation here.

Further, my child at first never used to let his mouth and chin be wiped without crying; from the fifteenth month on he kept perfectly quiet during the disagreeable operation. He must have noticed that this was finished sooner when he was quiet.

The same thing can be observed in every little child, provided he is not too much talked to, punished, yielded to, or spoiled. In the nineteenth month it happened with my child that he resisted the command to lie down in the evening. I let him cry, and raise himself on his bed, but did not take him up, did not speak to him, did not use any force, but remained motionless and watchful near by. At last he became tired, lay down, and fell asleep directly. Here he acquired an understanding of the uselessness of crying in order to avoid obedience to commands.

The *knowledge* of right (what is allowed and commanded) and of wrong (what is forbidden) had been long since acquired. In the seventeenth month, e. g., a sense of cleanliness was strongly developed, and later (in the thirty-third month) the child could not, without lively protest, behold his nurse acting contrary to the

directions that had been given to himself—e. g., putting the knife into her mouth or dipping bread into the milk. Emotions of this kind are less a proof of the existence of a sense of duty than of the *understanding* that violations of well-known precepts have unpleasant consequences —i. e., that certain actions bring in their train pleasant feelings, while other acts bring unpleasant feelings. How long before the knowledge of words these emotions began to exist I have, unfortunately, not succeeded in determining.

But in many of the above cases—and they might without difficulty be multiplied by diligent observation —there is not the least indication of any influence of spoken words. Whether no attempt at speaking has preceded, or whether a small collection of words may have been made, the cases of child-intelligence adduced in this chapter, observed by myself, prove that without knowledge of verbal language, and independently of it, the logical activity of the child attains a high degree of development, and no reason exists for explaining the intelligent actions of children who do not yet speak at all—i. e., do not yet clothe their ideas in words, but do already combine them with one another—as being different specifically from the intelligent (not instinctive) actions of sagacious orangs and chimpanzees. The difference consists far more in this, that the latter can not form so many, so clear, and so abstract conceptions, or so many and complicated combinations of ideas, as can the gifted human child in the society of human beings—*even before he has learned to speak.* When he has learned to speak, then the gap widens to such an extent that what before was in some

respects almost the equal of humanity seems now a repulsive caricature of it.

In order, then, to understand the real difference between brute and man, it is necessary to ascertain how a child and a brute animal may have ideas without words, and may combine them for an end: whether it is done, e. g., with memory-images, as in dreaming. And it is necessary also to investigate the *essential character of the process of learning to speak.*

Concerning the first problem, which is of uncommon psychogenetic interest and practical importance, a solution seems to be promised in the investigation of the formation of concepts in the case of those born deaf, the so-called deaf and dumb children. On this point I offer first the words of a man of practical experience.

The excellent superintendent of the Educational Institute for the Deaf and Dumb in Weimar, C. Oehlwein (1867), well says:

"The deaf-mute in his first years of life looks at, turns over, feels of objects that attract him, on all sides, and approaches those that are at a distance. By this he receives, like the young child who has all his senses, sensations and sensuous ideas;* and from the objects themselves he apprehends a number of qualities, which he compares with one another or with the qualities of other objects, but always refers to the object which at the time attracts him. Herein he has a more correct or less correct sense-intuition of this object, according as he has observed, compared, and comprehended more or less attentively. As this object has affected him through

* Empfindungsvorstellungen.

sight and feeling, so he represents it to other persons also by characteristic signs for sight and indirectly for feeling also. He shapes or draws a copy of the object seen and felt with life and movement. For this he avails himself of the means that Nature has placed directly within human power—the control over the movement of the facial muscles, over the use of the hands, and, if necessary, of the feet also. These signs, *not obtained from any one's suggestion*, self-formed, which the deaf-mute employs directly in his representation, are, as it were, the given outline of the image which he has found, and they stand therefore in the closest relation to the inner constitution of the individual that makes the representation.

"But we find not only that the individual senses of the deaf-mute, his own observation and apprehension, are formative factors in the occurrences of sensation and perception, as is of course the case, but that the qualities of the objects observed by him, and associated, according to his individual tendencies, are also raised by him, through comparison, separation, grouping—through his own act, therefore—to general ideas, concepts, although as yet imperfect ones, and they are named and recognized again by peculiar signs intelligible to himself.

"But in this very raising of an idea to a general idea, to a concept—a process connected with the forming of a sign—is manifested the influence of the lack of hearing and of speech upon the psychical development of the deaf-mute. It appears at first to be an advantage that the sign by which the deaf-mute represents an idea is derived from the impression, the image, the idea, which the user of the sign himself has or has had; he

expresses by the sign nothing foreign to him, but only what has become his own. But this advantage disappears when compared with the hindrance caused by this very circumstance in the raising of the individual idea to a general idea, for the fact that the latter is designated by the image, or the elements of the image in which the former consists, is no small obstacle to it in attaining complete generality. The same bond that unites the concept with the conceiver binds it likewise to one of the individual ideas conceived—e. g., when, by pointing to his own flesh, his own skin, he designates the concept flesh, skin (in general also the flesh or the skin of animals); whereas, by means of the word, which the child who has all his senses is obliged to learn, a constraint is indeed exercised as something foreign, but a constraint that simply enforces upon his idea the claim of generality.

"One example more. The deaf-mute designates the concept, or general idea, 'red' by lightly touching his lips. With this sign he indicates the red of the sky, of paintings, of dress-stuffs, of flowers, etc. Thus, in however manifold connection with other concepts his concept 'red' may be repeated, it is to him as a concept always *one* and the same only. It is *common* to *all* the connections in which it repeatedly occurs."

But before the thinking deaf-mute arrived at the concept "red," he formed for himself the ideas "lip, dress, sky, flower," etc.

For a knowledge of intellectual development in the child possessed of all the senses, and of the great extent to which he is independent of verbal language in the formation of concepts, it is indispensable to make a col-

lection of such concepts as uneducated deaf-mutes not acquainted either with the finger-alphabet or with articulation express by means of their own gestures in a manner intelligible to others. Their language, however, comprises "not only the various expressive changes of countenance (play of feature), but also the varied movements of the hands (gesticulations), the positions, attitudes, bearing, and movements of the other parts of the entire body, through which the deaf-mute naturally, i. e., *untouched by educational influences*, expresses his ideas and conceptions." But I refrain from making such a catalogue here, as we are concerned with the fact that *many concepts are, without any learning of words whatever, plainly expressed and logically combined with one another*, and their correctness is proved by the conduct of any and every untaught child born deaf. Besides, such a catalogue, in order to possess the psychogenetic value desired by me, needs a critical examination extremely difficult to carry through as to whether the "educational influences" supposed to be excluded are actually wholly excluded in all cases as they really are in some cases, e. g., in regard to food.

Degerando (1827) has enumerated a long list of concepts, which deaf-mutes before they are instructed represent by pantomimic gesture. Many of these forms of expression in French deaf-mutes are identical with those of German. It is most earnestly to be wished that this international language of feature and gesture used by children entirely uninstructed, born deaf, may be made accessible to psycho-physiological and linguistic study by means of pictorial representations—photographic best of all. This should be founded on the ex-

periences of German, French, English, Russian, Italian, and other teachers of deaf-mutes.

For there is hardly a better proof that thinking is not dependent on the language of words than the conduct of deaf-mutes, who express, indeed, many more concepts of unlike content in the same manner than any verbal language does—just as children with all their senses do before they possess a satisfactory stock of words—but who, by gesticulation and pantomime before receiving any instruction, demonstrate that concepts are formed without words.

With reference to the manner in which uneducated deaf-mutes speak, the following examples are characteristic performances in gesture-language:

One deaf-mute asks another, "Stay, go you?" (look of inquiry). Answer: "Go, I" (i. e., "Do you stay or go?" "I go"). "Hunter hare shoots."

"Arm, man, be strong," means, "The man's arm is strong."

"N., spectacles, see," means, "N. sees with the spectacles."

"Run I finished, go to sleep," means, "When I had finished running, I went to sleep." "Money, you?" means, "Have you money?"

One of the most interesting sights I know of, in a psychological and physiological point of view, is a conversation in gesture and pantomime between two or three children born totally deaf, who do not know that they are observed. I am indebted to Director Oehlwein, of Weimar, for the opportunity of such observations, as also for the above questions and answers. Especially those children (of about seven years) not yet instructed

in articulation employ an astonishing number of looks and gestures, following one upon another with great rapidity, in order to effect an understanding with one another. They understand one another very easily, but, because their gestures, and particularly their excessively subtilized play of feature, do not appear in ordinary life, these children are just as hard to understand for the uninitiated as are men who speak a wholly foreign language without any gestures. Even the eye of the deaf-mute has a different expression from that of the person who talks. The look seems more "interested," and manifestly far fewer unnecessary movements of the eyes and contractions of the facial muscles are made by the deaf-mute than by the child of the same age who has his hearing.

Further, deaf-mutes, even those of small ability, imitate all sorts of movements that are plainly visible much better, in general, than do persons with all their senses. I made, in presence of the children, several not very easy crossings of the fingers, put my hands in different positions, and the like—movements that they could not ever have seen—and I was surprised that some of the children at once made them deftly, whereas ordinary children first consider a long time, and then imitate clumsily. It is doubtless this exaltation of the imitative functions in deaf-mute children which makes it appear as if they themselves invented their gestures (see above, p. 23). Certainly they do not get their first signs through "any one's suggestion," they form them for themselves, but, so far as I see, only through imitation and the hereditary expressive movements. The signs are in great part themselves unabridged imitations. The agreement,

or "convention," which many teachers of deaf-mutes assume, and which would introduce an entirely causeless, not to say mysterious, principle, consists in this, that all deaf-mutes in the beginning imitate the same thing in the same way. Thus, through this perfectly natural accord of all, it comes to pass that they understand one another. When they have gained ideas, then they combine the separate signs in manifold ways, as one who speaks combines words, in order to express new ideas; they become thereby more and more difficult to be understood, and often are only with difficulty understood even among themselves; and they are able only in very limited degree to form concepts of a higher order. "Nothing, being dead, space"—these are concepts of a very high order for them.

For this reason it is easy to comprehend that a deaf-mute child, although he has learned but few words through instruction in articulation, weaves these continually into his pantomimic conversation in place of his former elaborate gestures. I observed that individual children, born totally deaf, preferred, even in conversation with one another, and when ignorant of the fact that I was observing them, the articulate words just learned, although these were scarcely intelligible, to their own signs.

Thus mighty is the charm of the spoken word, even when the child does not himself hear it, but merely feels it with his tongue.

But the schooling the deaf-mute must go through in order to become acquainted with the sensations of sight, touch, and movement that go with the sound, is unspeakably toilsome.

W. Gude says in his treatise, remarkable alike for acuteness and clearness, "Principles and Outlines of the Exposition of a Scheme of Instruction for an Institution for Deaf-Mutes" ("Grundsätze und Grundzüge zur Aufstellung eines Lehrplans für eine Taubstummen-Anstalt," 1881): "The utterances of tones and of articulate sounds called forth by involuntary stimulus during the first years, in deaf-mutes, are such unimportant motor phenomena that they are not immediately followed by a motor sensation. But when the deaf-mute child is more awake mentally, he perceives that his relatives make movements of the mouth in their intercourse, and repeated attempts of those about him to make themselves intelligible by pronouncing certain words to him are not entirely without effect upon the deaf-mute that is intellectually active. When such deaf-mutes now direct their attention to the matter, they succeed in regard to only a part of the sounds—those that are conspicuous to the eye in their utterance—in getting a tolerable imitation. Individual deaf-mutes go so far, in fact, as to understand various words correctly without repeating them; others succeed gradually in repeating such words as 'papa, mamma,' so that one can understand what is meant. Those who are deaf-mutes from birth do not, however, of themselves, succeed in imitating accurately other vocal sounds in general."

A deaf-mute, who had not been instructed, explained to Romanes, at a later period when he had learned the sign-language, that he had before thought in "images," which means nothing else than that he, in place of the words heard (in our case) and the digital signs seen (in his case), had made use of memory-images gained from

visual impressions, for distinguishing his concepts. Laura Bridgman, too, a person in general the subject of very incorrect inferences, who was not blind and deaf from birth, could form a small number of concepts that were above the lowest grade. These originated from the materials furnished by the sense of touch, the muscular sense and general sensibility, before she had learned a sort of finger-language. But she had learned to speak somewhat before she became dumb and blind. Children with sight, born deaf, seem not to be able to perform the simplest arithmetical operations, e. g., 214 — 96 and 908×70 (according to Asch, 1865), until after several years of continuous instruction in articulate speaking. They do succeed, however, and that without sound-images of words, and perhaps, too, without sight-images of words; in mental arithmetic without knowledge of written figures, by help of the touch-images of words which the tongue furnishes.

In any case uneducated persons born deaf can count by means of the fingers without the knowledge of figures; and, when they go beyond 10, the notched stick comes to their aid (Sicard and Degerando).

The language of gesture and feature in very young children, born dumb and not treated differently from other children, shows also, in most abundant measure, that concepts are formed without words. The child born deaf uses the primitive language of gesture to the same extent as does the child that has his hearing; the former makes himself intelligible by actions and sounds as the latter does, so that his deficiency is not suspected. This natural language is also *understood* by the child born deaf, so far as it is recognizable by his eye. In

the look and the features of his mother he reads her mood. But he very early becomes quiet and develops for himself, "out of unconscious gesticulation, the gesture language, which at first is not conventional, nay, is not in the strict sense quite a sign-language, but a mimetic-plastic representation of the influences experienced from the external world," since the deaf-mute imitates movements perceived, and the attitude of persons and the position of objects. Upon this pantomime alone rests the possibility of coming to an understanding, within a certain range, with deaf-mutes that have had no instruction at all. It can not, therefore, in its elementary form be conventional, as Hill, to whom I owe these data, rightly maintains. He writes concerning the child born deaf: "His voice seems just like that of other children. He screams, weeps, according as he feels uncomfortable; he starts when frightened by any noise. Even friendly address, toying, fun, serious threats, are understood by him as early as by any child." But he does not hear his own voice; it is not sound that frightens him, but the concussion; it is not the pleasant word that delights him, but the pleasant countenance of his mother. "It even happens, not seldom, that through encouragement to use the voice, these children acquire a series of articulate sounds, and a number of combinations of sounds, which they employ as the expression of their wishes." They not only *point out* the object desired, not only *imitate* movements that are to procure what they want, but they also outline the forms of objects wished for. They are able to conduct themselves so intelligently in this, that the deaf-mute condition is not discovered till the second year, or even later, and

then chiefly by their use of the eye, because in case of distant objects only those seen excite their attention.

From this behavior of infants born deaf it manifestly follows that even without the possibility of natural imitation of sounds, and without the knowledge of a single word, qualities may be blended with qualities into concepts. Thus, *primitive thinking is not bound up with verbal language.* It demands, however, a certain development of the cerebrum, probably a certain very considerable number of ganglionic cells in the cerebral cortex, that stand in firm organic connection with one another. The difference between an uninstructed young deaf-mute and a cretin is immense. The former can learn a great deal through instruction in speaking, the latter can not. This very ability to learn, in the child born deaf, is greater than in the normal child, in respect to pantomime and gesture. If a child with his hearing had to grow up among deaf-mutes, he would undoubtedly learn their language, and would in addition enjoy his own voice without being able to make use of it; but he would probably be discovered, further on, without testing his hearing, by the fact that he was not quite so complete a master of this gesture-language as the deaf-mutes, on account of the diversion of his attention by sound.

The total result of the foregoing observations concerning the capacity of accomplishment on the part of uneducated deaf-mutes in regard to the natural language of gesture and feature, demonstrates more plainly than any other fact whatever that, without words and without signs for words, thought-activity exists—that thinking takes place when both words and signs for words

are wanting. Wherefore, then, should the logical combination of ideas in the human being born perfect begin only with the speaking of words or the learning to speak? Because the adult supposes that he no longer thinks without words, he easily draws the erroneous conclusion that no one, that not even he himself, could think before the knowledge of verbal language. In truth, however, it was *not language that generated the intellect; it is the intellect that formerly invented language: and even now the new-born human being brings with him into the world far more intellect than talent for language.*

CHAPTER XVII.

LEARNING TO SPEAK.

No human being remembers how he learned his mother-tongue in early youth, and the whole human race has forgotten the origin of its articulate speech as well as of its gestures; but every individual passes perceptibly through the stage of learning to speak, so that a patient observer recognizes much as conformable to law.

The acquisition of speech belongs to those physiological problems which can not be solved by the most important means possessed by physiology, vivisection. And the speechless condition in which every human being is born can not be regarded as a disease that may be healed by instruction, as is the case with certain forms of acquired aphasia. A set of other accomplishments, such as swimming, riding, fencing, piano-play-

ing, the acquirement of which is physiological, are learned like articulate speech, and nobody calls the person that can not swim an anomaly on that account. The *inability to appropriate* to one's self these and other co-ordinated muscular movements, this alone is abnormal. But we can not tell in advance in the case of any new-born child whether he will learn to speak or not, just as in the case of one who has suffered an obstruction of speech or has entirely lost speech, it is not certain whether he will ever recover it.

In this the normal child that does *not yet* speak perfectly, resembles the diseased adult who, for any cause, *no longer* has command of language. And to compare these two with each other is the more important, as at present no other empirical way is open to us for investigating the nature of the process of learning to speak; but this way conducts us, fortunately, through pathology, to solid, important physiological conclusions.

1. Disturbances of Speech in Adults.

The command of language comprises, on the one hand, the understanding of what is spoken; on the other hand, the utterance of what is thought. It is at the height of its performance in free, intelligible, connected speech. Everything that disturbs the *understanding of words heard* must be designated disturbance of speech equally with everything that disturbs the *production of words* and sentences.

By means of excellent investigations made by many persons, especially by Broca, Wernicke, Kussmaul, it has become possible to make a topical division of most of the observed disturbances of speech of both kinds.

In the first class, which comprises the *impressive* processes, we have to consider every functional disturbance of the peripheral ear, of the auditory nerve and of the central ends of the auditory nerve; in the second class, viz., the *expressive* processes, we consider every functional disturbance of the apparatus required for articulation, including the nerves belonging to this in their whole extent, in particular the hypoglossus, as motor nerve of the tongue, and certain parts of the cerebral hemispheres from which the nerves of speech are excited and to which the sense-impressions from without are so conducted by connecting fibers that they themselves or their memory-images can call forth expressive, i. e., motor processes. The diagram, Fig. 1, illustrates the matter.

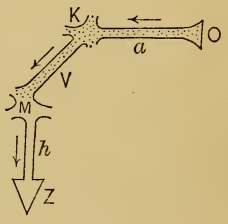

Fig. 1.

The peripheral ear *o*, with the terminations of the auditory nerve, is by means of sensory fibers *a*, that are connected with the auditory nerve, in connection with the storehouse of sound-impressions, K. This is connected by means of the intercentral paths *v* with the motor speech-center M. From it go out special fibers of communication, *h*, to the motor nerves of speech which terminate in the external instruments of articulation, *z*.

The impressive nerve-path, *o a* K, is centripetal; the expressive, M *h z*, centrifugal; *v*, intercentral.

When the normal child learns to speak, *o* receives the sound-impressions; by *a* the acoustic-nerve excitations are passed along to K, and are here stored up, every distinctly heard sound (a tone, a syllable, a word) leav-

ing an impression behind in K. It is very remarkable here that, among the many sounds and noises that impress themselves upon the portions of the brain directly connected with the auditory nerve, a selection is made in the sound-field of speech, K, since all those impressions that can be reproduced, among them all the acoustic images necessary for speech, are preserved, but many others are not, e. g., thunder, crackling. Memory is indistinct with regard to these. From K, when the sound-images or sound-impressions have become sufficiently strong and numerous, the nerve-excitement goes farther through the connecting paths *v* to M, where it liberates motor impulses, and through *h* sets in activity the peripheral apparatus of speech, *z*.

Now, speech is disturbed when at any point the path *o z* is interrupted, or the excitation conducted along the nerve-fibers and ganglionic cells upon the hearing of something spoken or upon the speaking of something represented in idea (heard inwardly) is arrested, a thing which may be effected without a total interruption of the conduction, e. g., by means of poison and through anatomical lesions.

On the basis of these physiological relations, about which there is no doubt, I divide, then, all pure disturbances of speech, or *lalopathies*, into three classes:

(1) Periphero-Impressive or Perceptive Disturbances.

The organ of hearing is injured *at its peripheral extremity*, or else the acusticus in its course; then occurs *difficulty of hearing* or *deafness*. What is spoken is not correctly heard or not heard at all: the utterance is correct only in case the lesion happened late. If it is

inborn, then this lack of speech, alalia, is called *deaf-mutism*, although the so-called deaf and dumb are not in reality dumb, but only deaf. If words spoken are incorrectly heard on account of acquired defects of the peripheral ear, the patient mis-hears, and the abnormal condition is called paracusis.

(2) Central Disturbances.

a. The higher impressive central paths are disturbed: *centro-sensory dysphasia and aphasia*, or *word-deafness.* Words are heard but not understood. The hearing is acute. "Patients may have perfectly correct ideas, but they lack the correct expression for them; not the thoughts but the words are confused. They would understand the ideas of others also if they only understood the words. They are in the position of persons suddenly transported into the midst of a people using the same sounds but different words, which strike upon their ear like an unintelligible noise." (Kussmaul.) Their articulation is without defect, but what they say is unintelligible because the words are mutilated and used wrongly. C. Wernicke discovered this form, and has separated it sharply from other disturbances of speech. He designated it sensory aphasia. Kussmaul later named this abnormal condition word-deafness (surditas verbalis).

b. The connections between the impressive sound-centers and the motor speech-center are injured. Then we have intercentral conductive dysphasia and aphasia. What is spoken is heard and understood correctly even when *v* is completely interrupted. The articulation is not disturbed, and yet the patient utters no word of

himself. He can, however, read aloud what is written. (Kussmaul.) The word that has just been read aloud by the patient can not be repeated by him, neither can the word that has been pronounced to him; and, notwithstanding this, he reads aloud with perfect correctness. In this case, then, it is impossible for the patient of his own motion, even if the memory of the words heard were not lost, to set in activity the expressive mechanism of speech, although it might remain uninjured.

c. The motor speech-center is injured. Then we have centro-motor dysphasia and aphasia. If the center is completely and exclusively disturbed, then it is a case of pure ataxic aphasia. Spontaneous speaking, saying over of words said by another, and reading aloud of writing, are impossible. (Kussmaul.) On the other hand, words heard are understood, although the concepts belonging with them can not be expressed aloud. The verbal memory remains; and the patient can still express his thoughts in writing and can copy in writing what he reads or what is dictated to him.

(3) Periphero-Expressive or Articulatory Disturbances.

The centrifugal paths from the motor speech-center to the motor nerves of speech and to their extremities, or else these nerves themselves, are injured. Then occurs *dysarthria*, and, if the path is totally impassable at any place, *anarthria*. The hearing and understanding of words are not hindered, but speaking, repeating the words of others, and reading aloud are, as in the last case (2, *c*), impossible. In general this form can not be distinguished from the foregoing when both are devel-

oped in an extreme degree, except in cases of peripheral dysarthria, i. e., dyslalia, since, as may be easily understood, it makes no difference in the resulting phenomena whether the motor center itself is extirpated or its connections with the motor outlet are absolutely cut off just where the latter begins; but if this latter is injured nearer to the periphery, e. g., if the hypoglossus is paralyzed, then the phenomena are different (paralalia, mogilalia). Here belongs all so-called mechanical dyslalia, caused by defects of the peripheral speech-apparatus.

Of these five forms each occurs generally only in connection with another; for this reason the topical diagnosis also is often extraordinarily difficult. But enough cases have been accurately observed and collected to put it almost beyond a doubt that each form may also appear for a short time purely by itself. To be sure, the anatomical localization of the impressive and expressive paths is not yet ascertained, so that for the present the centripetal roads from the acusticus to the motor speech-center, and the intercentral fibers that run to the higher centers, are as much unknown as the centrifugal paths leading from them to the nuclei of the hypoglossus; but that the speech-center discovered by Broca is situated in the posterior portion of the third frontal convolution (in right-handed men on the left, in left-handed on the right) is universally acknowledged.

Further, it results from the abundance of clinical material, that the acoustic-center K must be divided into a sound-center L, a syllable-center S, a word-center W, each of which may be in itself defective, for cases have been observed in which sounds were still recog-

nized and reproduced, but not syllables and words, also cases in which sounds and syllables could be dealt with but no words; and, finally, cases in which all these were wanting. The original diagram is thereby considerably complicated, as the simple path of connection between K and M has added to it the arcs L S M and L S W M (Fig. 2).

The surest test of the perfect condition of all the segments is afforded by the repetition of sounds, syllables, and words pronounced by others.

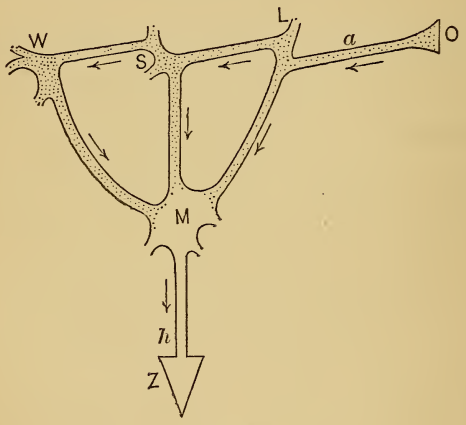

Fig. 2.

Syllables and sounds, but no words, can be pronounced if W is missing or the path S W or W M is interrupted; no syllables if S is missing or L S or S M is interrupted. If L is missing, then nothing can be repeated from hearing. If L M is interrupted, then syllables and words are more easily repeated than simple sounds, so far as the latter are not syllables. If L S is

interrupted, then simple sounds only can be repeated. All these abnormal states have been actually observed. The proofs are to be found in Kussmaul's classic work on the disturbances of speech (1877). Even the strange case appears in which, L M being impracticable, syllables are more easily repeated than simple sounds.

If *a* is interrupted before the acquirement of speech, and thus chronic deafness is present in very early childhood, articulation may still be learned through visual and tactile impressions; but in this case the sound-center L is not developed. Another, a sound-touch-center, comes in its place in deaf-mutes when they are instructed, chiefly through the tactile sensations of the tongue; and, when they are instructed in reading (and writing), a sound-sight- (or letter) center. This last is, on the contrary, wanting to those born blind; and both are wanting to those born blind and deaf. Instead is formed in them through careful instruction, by means of the tactile sensations of the finger-tips, a center for signs of sound that are known by touch (as with the printed text for the blind).

Accordingly, the eye and ear are not absolutely indispensable to the acquirement of a verbal language; but for the thorough learning of the verbal language in its entire significance both are by all means indispensable. For, the person born blind does not get the significance of words pertaining to light and color. For him, therefore, a large class of conceptions, an extensive portion of the vocabulary of his language, remains empty sound. To the one born deaf there is likewise an extensive district of conceptions closed, inasmuch as

all words pertaining to tone and noise remain unintelligible to him.

Moreover, those born blind and deaf, or those born blind and becoming deaf very early, or those born deaf and becoming blind very early, though they may possess ever so good intelligence, and perhaps even learn to write letters, as did the famous Laura Bridgman, will invariably understand only a small part of the vocabulary of their language, and will not articulate correctly.

Those born deaf are precisely the ones that show plainly how necessary hearing is for the acquirement of perfectly articulate speech. One who is deaf from birth does not even learn to speak half a dozen sounds correctly without assistance, and the loss of speech that regularly follows deafness coming on in children who have already learned to speak, shows how inseparably the learning and the development of perfect articulation are bound up with the hearing. Even the deafness that comes on in maturer years injures essentially the agreeable tone, often also the intelligibility, of the utterance.

2. The Organic Conditions of Learning to Speak.

How is it, now, with the normal child, who is learning to speak? How is it as to the existence and practicability of the nervous conduction, and the genesis of the centers?

In order to decide these questions, a further extension of the diagram is necessary (Fig. 3).

For the last diagram deals only with the hearing and pronouncing of sounds, syllables, and single words,

not with the grammatical formation and syntactical grouping of these; there must further be a center of higher rank, the *dictorium*, or center of diction (Kussmaul), brought into connection with the centers L S and W. And, on the one hand, the word-image acquired

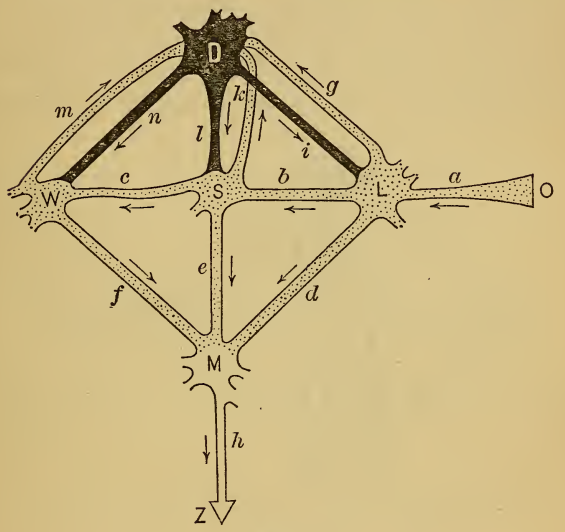

Fig. 3.

(by hearing) must be at the disposition of the diction-center, an excitation, therefore, passing from W to D (through *m*); on the other hand, an impulse must go out from the diction-center to pronounce the word that is formed and placed so as to correspond to the sense (through *n*). The same is true for syllables and sounds, whose paths to and from are indicated by *k* and *l*, as well as by *g* and *i*. These paths of connection must be of twofold sort. The excitement can not pass off to the

diction-center D on the same anatomical path as the return impulse from D, because not a single case is known of a nerve-fiber that in natural relations conducts both centrifugally *and* centripetally, although this possibility of double conduction does occur under artificial circumstances. Apart, then, from pathological experience, which seems to be in favor of it, the separation of the two directions of the excitement seems to be justified anatomically also. On the contrary, it is questionable

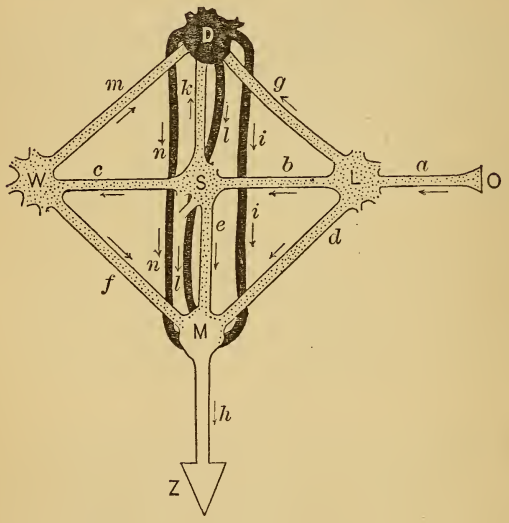

Fig. 4.

whether the impulse proceeding from D does not arrive directly at the motor speech-center, instead of passing through W, S, or L. The diagram then represents it as follows (Fig. 4). Here the paths of direct connection *i*, *l*, and *n* from D to M represent that which was just

now represented by *i* L *d* and *l* S *e* and *n* W *f*, respectively; in Fig. 4, *i* conducts only sound-excitations coming from L, *l* only excitations coming from S, and *n* only those coming from W, as impulses for M. For the present, I see no way of deciding between the two possibilities. They may even exist both together. All the following statements concerning the localization of the disturbances of speech and the parallel imperfections of child-speech apply indifferently to either figure; it should be borne in mind that the nerve-excitement always goes *only* in the direction of the arrows, never in the opposite direction, through the nervous path corresponding to them. Such a parallel is not only presented, as I have found, and as I will show in what follows, by the most superficial exhibition of the manifold deviations of child-speech from the later perfect speech, but is, above all, necessary for the answering of the question: what is the condition of things in learning to speak?

3. Parallel between the Disturbances of Speech in Adults and the Imperfections of Speech in the Child.

In undertaking to draw such a parallel, I must first of all state that in regard to the pathology of the subject, I have not much experience of my own, and therefore I rely here upon Kussmaul's comprehensive work on speech-disturbances, from which are taken most of the data that serve to characterize the individual deviations from the rule. In that work also may be found the explanations, or precise definitions, of almost all the names —with the exception of the following, added here for the sake of brevity—skoliophasia, skoliophrasia, and pa-

limphrasia. On the other hand, the statements concerning the speech of the child rest on my own observations of children—especially of my own son—and readers who give their attention to little children may verify them all; most of them, indeed, with ease. Only the examples added for explaining mogilalia and paralalia are taken in part from Sigismund, a few others from Vierordt. They show more plainly (at least concerning rhotacism) than my own notes, some imperfections of articulation of the child in the second year, which occur, however, only in single individuals. In general the defects of child-speech are found to be very unequally distributed among different ages and individuals, so that we can hardly expect to find all the speech-disturbances of adults manifested in typical fashion in one and the same child. But with very careful observation it may be done, notwithstanding; and when several children are compared with one another in this respect, the analogies fairly force themselves upon the observer, and there is no break anywhere.

The whole group into which I have tried to bring in organic connection all the kinds of disturbances and defects of speech in systematic form falls into three divisions:

1. Imperfections not occasioned by disturbance of the intelligence — pure speech-disturbances or *lalopathies.*

2. Imperfections occasioned solely by disturbances of the intelligence—disturbances of continuous speech or discourse (Rede)—*dysphrasies.*

3. Imperfections of the language of gesture and feature—*dysmimies.*

I. LALOPATHY.

A. The Impressive Peripheral Processes disturbed.

Deafness.—Persons able to speak but who have become deaf do not understand what is spoken simply because they can *no longer* hear. The newly born do not understand what is spoken because they can *not yet* hear. The paths *o* and *a* are not yet practicable. All those just born are deaf and dumb.

Difficulty of Hearing.—Persons who have become hard of hearing do not understand what is spoken, or they misunderstand, because they *no longer* hear distinctly. Such individuals easily hear wrong (paracusis).

Very young infants do not understand what is spoken, for the reason that they do *not yet* hear distinctly; *o* and *a* are still difficult for the acoustic nerve-excitement to traverse. Little children very easily hear wrong on this account.

B. The Central Processes disturbed.

Dysphasia.—In the child that can use only a small number of words, the cerebral and psychical act through which he connects these with his ideas and gives them grammatical form and syntactical construction in order to express the movement of his thought is *not yet* complete.

(1) The Sensory Processes centrally disturbed.

Sensory Aphasia (Wernicke), *Word-Deafness* (Kussmaul).—The child, in spite of good hearing and sufficiently developed intelligence, can *not yet* understand spoken words because the path *m* is not yet

formed and the storehouse of word-images W is still empty or is just in the stage of origination.

Amnesia, Amnesic Dysphasia and Aphasia, Partial and Total Word-Amnesia, Memory-Aphasia.—The child has as yet no word-memory, or only a weak one, utters meaningless sounds and sound-combinations. He can *not yet* use words because he does not yet have them at his disposal as acoustic sound-combinations. In this stage, however, much that is said to him can be repeated correctly in case W is passable, though empty or imperfectly developed.

(2) The Sensori-motor Processes of Diction disturbed.

Acataphasia (Steinthal).—The child that has already a considerable number of words at his disposal is *not yet* in condition to arrange them in a sentence syntactically. He can *not yet* frame correct sentences to express the movement of his thought, because his diction-center D is still imperfectly developed. He expresses a whole sentence by a word; e. g., *hot!* means as much as "The milk is too hot for me to drink," and then again it may mean "The stove is too hot!" *Man!* means "A strange man has come!"

Dysgrammatism (Kussmaul) *and Agrammatism* (Steinthal).—Children can *not yet* put words into correct grammatical form, decline, or conjugate. They like to use the indefinite noun-substantive and the infinitive, likewise to some extent the past participle. They prefer the weak inflection, ignore and confound the articles, conjunctions, auxiliaries, prepositions, and pronouns. In place of "I" they say their own names, also *tint* (for "Kind"—child or "baby"). Instead of "Du, er, Sie" (thou,

he, you), they use proper names, or man, papa, mamma. Sometimes, too, the adjectives are placed after the nouns, and the meaning of words is indicated by their position with reference to others, by the intonation, by looks and gestures. Agrammatism in child-language always appears in company with acataphasia, often also in insane persons. When the imbecile Tony says, "Tony flowers taken, attendant come, Tony whipped" (Tony Blumen genommen, Wärterin gekommen, Tony gehaut), she speaks exactly like a child (Kussmaul), without articles, pronouns, or auxiliary verbs, and, like the child, uses the weak inflection. The connection *m* of the word-image-center W with the diction-center D, i. e., of the word-memory with grammar, and the centers themselves, are as yet very imperfectly developed, unused.

Bradyphasia.—Children that can already frame sentences take a surprising amount of time in speaking on account of the slowness of their diction. In D and W *m* in the cerebral cortex the hindrances are still great because of too slight practice.

(3) The Motor Processes centrally disturbed.

a. Centro-motor Dysphasia and Aphasia, Aphemia, Asymbolia, Asemia. — Children have not yet learned, or have hardly learned, the use of language, although their intelligence is already sufficient. There is no longer any deficiency in the development of the external organs of speech, no muscular weakness, no imperfection of the nervous structures that effect the articulation of the separate sounds, for intelligence shows itself in the child's actions; he forms the separate

sounds correctly, unintentionally; his hearing is good and the sensory word-memory is present, since the child already obeys. His *not yet* speaking at this period (commonly as late as the second year) must accordingly be essentially of centro-motor character.

In the various forms of this condition there is injury or lack of sufficient relative development either in the centro-motorium M or in the paths that lead into it, *d*, *e*, *f*, as well as *i*, *l*, *n*.

a. Central Dysarthria and Anarthria.—In the child at the stage of development just indicated articulation is *not yet* perfect, inasmuch as while he often unintentionally pronounces correctly sounds, syllables, and single words, yet he can not form these intentionally, although he hears and understands them aright. He makes use of gestures.

Ataxic Aphasia (*Verbal Anarthria*).—The child that already understands several words as sound-combinations and retains them (since he obeys), can not yet use these in speech because he has not yet the requisite centro-motor impulses. He forms correctly the few syllables he has already learned of his future language, i. e., those he has at the time in memory as sound-combinations (sensory), but can *not yet* group them into new words; e. g., he says *bi* and *te* correctly, learns also to say "*bitte*," but not yet at this period "tibe," "tebi." He lacks still the motor co-ordination of words.

At this period the gesture-language and modulation of voice of the child are generally easy to understand, as in case of pure ataxic aphasia (the verbal asemia or asymbolia of Finkelnburg) are the looks and gestures

of aphasic adults. Chiefly *n*, *f*, and M are as yet imperfectly developed.

Central Stammering and Lisping (*Literal Dysarthria*).—Children just beginning to form sentences stammer, not uttering the sounds correctly. They also, as a rule, lisp for a considerable time, so that the words spoken by them are still indistinct and are intelligible only to the persons most intimately associated with them.

The paths *d* and *i*, and consequently the centro-motorium M, come chiefly into consideration here; but L also is concerned, so far as from it comes the motor impulse to make a sound audible through M.

The babbling of the infant is not to be confounded with this. That imports merely the unintentional production of single disconnected articulate sounds with non-coördinated movements of the tongue on account of uncontrolled excitement of the nerves of the tongue.

Stuttering (*Syllabic Dysarthria*).—Stutterers articulate each separate sound correctly, but connect the consonants, especially the explosive sounds, with the succeeding vowels badly, with effort as if an obstacle were to be overcome. The paths *i* and *l* are affected, and hence M is not properly excited. S, too, comes under consideration in the case of stuttering, so far as impulses go out from it for the pronunciation of the syllables.

Children who can not yet speak of themselves but can repeat what is said for them, exert themselves unnecessarily, making a strong expiratory effort (with the help of abdominal pressure) to repeat a syllable still unfamiliar, and they pause between the doubled or tripled consonant and vowel. This peculiarity, which soon

passes away and is to be traced often to the lack of practice and to embarrassment (in case of threats), and which may be observed *occasionally* in every child, is stuttering proper, although it appears more seldom than in stutterers. Example: The child of two years is to say "Tischdecke," and he begins with an unnecessary expiratory effort, *T-t-itt-t*, and does not finish.

Stuttering is by no means a physiological transition-stage through which every child learning to speak must necessarily pass. But it is easily acquired, in learning to speak, by imitation of stutterers, in frequent intercourse with them. Hence, stutterers have sometimes stuttering children.

β. Stumbling at Syllables.—Children that already articulate correctly separate sounds, and do so intentionally, very often put together syllables out of the sounds incorrectly, and frame words incorrectly from the syllables, where we can not assume deficient development of the external organs of speech; this is solely because the co-ordination is still imperfect. The child accordingly says *beti* before he can say *bitte;* so too *grefessen* instead of *gefressen.*

The tracts *l* and *n* are still incompletely developed; also S and W, so far as impulses come thence to utter syllables by means of M.

b. Paraphasia.—Children have learned some expressions in their future language, and use them independently but wrongly; they put in the place of the appropriate word an incorrect one, confounding words because they can *not yet* correctly combine their ideas with the word-images. They say, e. g., *Kind* instead of "Kinn," and *Sand* instead of "Salz"; also *Netz* for

"Nest" and *Billard* for "Billet," *Matrone* for "Patrone."

The connection of D with M through *n* is still imperfect, and perhaps also M is not sufficiently developed.

Making Mistakes in Speaking (*Skoliophasia*).—In this kind of paraphasia in adults the cause is a lack of attention; therefore purely central concentration is wanting, or one fails to "collect himself"; there is distraction, hence the unintentional, frequently unconscious, confounding of words similar in sound or connected merely by remote, often dim, reminiscences. This kind of mis-speaking through carelessness is distinguished from skoliophrasia (see below) by the fact that there is no disturbance of the intelligence, and the correction easily follows.

Skoliophasia occurs regularly with children in the second and third years (and later). The child in general has not yet the ability to concentrate his attention upon that which is to be spoken. He *wills* to do it but *can* not yet. Hence, even in spite of the greatest effort, occur often erroneous repetitions of words pronounced for him (aside from difficulties of articulation, and also when these are wanting); hence confounding (of words), wrong forms of address, e. g., *Mama* or *Helene* instead of "Papa," and *Papa* instead of "Marie."

c. Taciturnity (*Dumbness*).—Individual human beings of sound physical condition who can speak very well are dumb, or speak only two or three words in all for several years, because they no longer *will* to speak (e. g., in the belief that silence prevents them from doing wrong).

This taciturnity is not to be confounded with the

paranoic aphrasia in certain insane persons—e. g., in catatonia, where the will is paralyzed.

It also occurs—seldom, however—that children who have already learned to speak pretty well are dumb, or speak only a few words—among these the word *no*—during several months, or speak only with certain persons, because they *will not* speak (out of obstinacy, or embarrassment). Here an organic obstacle in the motor speech-center is probable. For voluntary dumbness requires great strength of will, which is hardly to be attributed to the child. The unwillingness to speak that is prompted by *fun* never lasts long.

C. The Expressive Peripheral Processes disturbed.

(1) Dyslalia and Alalia (Peripheral Dysarthria and Anarthria).

The infant can *not yet* articulate correctly, or at all, on account of the still deficient development, and afterward the lack of control, of the nerves of speech and the external organs of speech. The complete inability to articulate is called alalia. The newly born is alalic. Dyslalia continues with many children a long time even after the learning of the mother-tongue. This is always a case simply of imperfections in *h* and *z*.

a. Bulbo-nuclear Stammering (*Literal Bulbo-nuclear Dysarthria and Anarthria*).—Patients who have lost control over the muscles of speech through bulbo-nuclear paralysis, stammer before they become speechless, and along with paralysis and atrophy of the tongue occur regularly fibrillar contractions of the muscles of the tongue. The tongue is *no longer* regulated by the will.

The child that has not yet gained control over his vocal muscles stammers before he can speak correctly, and, according to my observations, regularly shows fibrillar contractions of the muscles of the tongue along with an extraordinary mobility of the tongue. The tongue is *not yet* regulated by the will. Its movements are aimless.

b. Mogilalia.—Children, on account of the as yet deficient control of the external organs of speech, especially of the tongue, can *not yet* form some sounds, and therefore omit them. They say, e. g., *in* for "hin," *ätz* for "Herz," *eitun* for "Zeitung," *ere* for "Schere."

Gammacism.—Children find difficulties in the voluntary utterance of K and Ks (*x*), and indeed of G, and therefore often omit these sounds without substituting others; they say, e. g, *atsen* for "Klatschen," *atten* for "Garten," *asse* for "Gasse," *all* for "Karl," *ete* for "Grete" (in the second year), *wesen* for "gewesen," *opf* for "Kopf."

Sigmatism.—All children are late in learning to pronounce correctly S, and generally still later with Sch, and therefore omit both, or in a lisping fashion put S in place of Sch; more rarely Sch in place of S. They say, e. g., *saf* in place of "Schaf," *int* for "singt," *anz* for "Salz," *lafen* and *slafen* for "schlafen," *iss* for "Hirsch," *pitte* for "Splitter," *tul* for "Stuhl," *wein* for "Schwein," *Tuttav* for "Gustav," *torch* for "Storch" (second year), *emele* for "Schemel," *webenau* for "Fledermaus," but also *Kusch* for "Kuss." But in no case have I myself heard a child regularly put "sch" in place of *s*, as *Joschef* for "Josef." This form, perhaps,

occurs in Jewish families; but I have no further observations concerning it as yet.

Rhotacism.—Many children do not form R at all for a long time and put nothing in place of it. They say *duch* for "durch," *bot* for "Brot," *unte* for "herunter," *tautech* for "traurig," *ule* for "Ruhe," *tänen* for "Thränen," *ukka* for "Zucker." On the contrary, some form early the R lingual, guttural, and labial, but all confound now and then the first two with each other.

Lambdacism.—Many children are late in learning to utter L, and often omit it. They say, e. g., *icht* for "Licht," *voge* for "Vogel," *atenne* for "Laterne," *batn* for "Blatt," *mante* for "Mantel."

(2) Literal Pararthria or Paralalia.

Children who are beginning to repeat intentionally what is said, often put another sound in place of the well-known correct (no doubt intended) one; this on account of deficient control of the tongue or other peripheral organs of speech. E. g., they say *t* in place of *p*, or *b* for *w* (*basse* for "Wasser" and for "Flasche"), *e* for *i* and *o* for *u*, as in *bete* for "bitte," and *Ohr* for "Uhr."

Paragammacism.—Children supply the place of the insuperably difficult sounds G, K, X by others, especially D and T, also N, saying, e. g., *itte* for "Rike," *finne* for "Finger," *tein* for "Klein," *toss* for "gross," *atitte* for "Karnickel," *otute* for "Kuk," *attall* for "Axel," *wodal* for "Vogel," *tut* for "gut," *tatze* for "Katze."

Parasigmatism.—Children are late in learning to

utter S and Sch correctly. They often supply the place of them, before acquiring them, by other sounds, saying, e. g., *tule* for "Schule," *ade* for "Hase," *webbe* for "Wasser," *beb* for "bös," *bebe* for "Besen," *gigod* for "Schildkröte," *baubee* for "Schwalbe."

Pararhotacism.—Most children, if not all, even when they have very early formed R correctly (involuntarily), introduce other sounds in place of it in speaking—e. g., they say *moigjen* for "morgen," *matta* for "Martha," *annold* for "Arnold," *jeiben* for "reiben," *amum* for "warum," *welfen* for "werfen."

Paralambdacism.—Many children who do not learn until late to utter L put in its place other sounds; saying, e. g., *bind* for "Bild," *bampe* for "Lampe," *tinne* for "stille," *degen* for "legen," *wewe* for "Löwe," *ewebau* for "Elephant."

(3) Bradylalia or Bradyarthria.

Children reciting for the first time something learned by heart speak not always indistinctly, but, on account of the incomplete practicability of the motor-paths, slowly, monotonously, without modulation. Sounds and syllables do *not yet* follow one another quickly, although they are already formed correctly. The syllables belonging to a word are often separated by pauses like the words themselves—a sort of dysphasia-of-conduction on account of the more difficult and prolonged conduction of the motor-impulse. I knew a boy (feeble-minded, to be sure) who took from three to eight seconds for answering even the simplest question; then came a regular explosion of utterance. Yet he did not stutter or stammer. When he had only *yes*

or *no* to answer, the interval between question and answer was shorter.

Here belong in part also the imperfections of speech that are occasioned by too large a tongue (macroglossia). When a child is born with too large a tongue, he may remain long alalic, without the loss of intellectual development, as was observed to be the case by Paster and O. von Heusinger (1882).

II. DYSPHRASIA (DYSLOGICAL DISTURBANCES OF SPEECH).

The child that can already speak pretty correctly deforms his speech after the manner of insane persons, being moved by strange caprices, because his understanding is not yet sufficiently developed.

Logorrhœa (*Loquaciousness*).—It is a regular occurrence with children that their pleasure in articulation and in vocal sound often induces them to hold long monologues, sometimes in articulate sounds and syllables, sometimes not. This chattering is kept up till the grown people present are weary, and that by children who can not yet talk; and their screaming is often interrupted only by hoarseness, just as in the case of the polyphrasia of the insane.

Dysphrasia of the Melancholy.—Children exert themselves perceptibly in their first attempts to speak, answer indolently or not at all, or frequently with embarrassment, always slowly, often with drawl and monotone, very frequently coming to a stop. They also sometimes begin to speak, and then lose at once the inclination to go on.

Dysphrasia of the Delirious (*Wahnsinnigen*).—

Children that have begun to speak often make new words for themselves. They have already invented signs before this; they are also unintelligible oftentimes because they use the words they have learned in a different sense.

Dysphrasia of the Insane (*Verrückten*).—The child is not yet prepared to speak. He possesses only non-co-ordinated sounds and isolated rudiments of words, primitive syllables, roots, as the primitive raw material of the future speech.

In many insane persons only the disconnected remains or ruins of their stock of words are left, so that their speech resembles that of the child at a certain stage.

Dysphrasia of the Feeble-minded.—The child at first reacts only upon strong impressions, and that often indolently and clumsily and with outcry; later, upon impressions of ordinary strength, without understanding —laughing, crowing, uttering disconnected syllables.

So the patient reacts either upon strong impressions only, and that indolently, bluntly, with gestures that express little and with rude words, or he still reacts upon impressions of ordinary strength, but in flat, silly, disconnected utterances.

Dysphrasia of Idiots.—Children have command at the beginning of no articulate sounds; then they learn these and syllables; after this also words of one syllable; then they speak short words of more than one syllable and sentences, but frequently babble forth words they have heard without understanding their meaning, like parrots.

Imbeciles also frequently command only short words and sentences or monosyllabic words and sounds, or, final-

ly, they lack all articulate sound. Many microcephalous idiots babble words without understanding their meaning, like little children.

Echo-speech or Echolalia (*Imitative Reflex Speech*). —Children not yet able to frame a sentence correctly like to repeat the last word of a sentence they have heard; and this, according to my observations and researches, is so general that I am forced to call this echolalia a physiological transition stage. Of long words said to them, the children usually repeat only the last two syllables or the last syllable only. The feeble-minded also repeat monotonously the words and sentences said by a person in their neighborhood without showing an awakened attention, and in general without connecting any idea with what they say. (Romberg.)

Interjectional Speech.—Children sometimes have a fancy for speaking in interjections. They express vague ideas by single vowels (like *ä*), syllables (e. g., *na*, *da*), and combinations of syllables, and frequently call out aloud through the house meaningless sounds and syllables. D and W are as yet undeveloped.

Often, too, children imitate the interjections used by members of the family—*hop! patsch*, *bauz!* an interjectional echolalia. Many deranged persons express their feelings in like manner, in sounds, especially vowels, syllables, or sound-combinations resembling words, which are void of meaning or are associated merely with obscure ideas (Martini). Then D is connected with M only through L and S, and so through *i* and *e*.

Embolophrasia.—Many children, long after they have overcome acataphasia and agrammatism, delight

in inserting between words sounds, syllables, and words that do not belong there; e. g., they double the last syllable of every word and put an *eff* to it: *ich-ich-eff*, *bin-in-eff*, etc., or they make a kind of bleat between the words (Kussmaul); and, in telling a story, put extra syllables into their utterance while they are thinking.

Many adults likewise have the disagreeable habit of introducing certain words or meaningless syllables into their speech, where these do not at all belong; or they tack on diminutive endings to their words. The syllables are often mere sounds, like *eh*, *uh*; in many cases they sound like *eng*, *ang* (angophrasia—Kussmaul).

Palimphrasia.—Insane persons often repeat single sounds, syllables, or sentences, over and over without meaning; e. g., "I am-am-am-am."

"The phenomenon in many cases reminds us of children, who say or sing some word or phrase, a rhyme or little verse, so long continuously, like automata, that the by-standers can endure it no longer. It is often the ring of the words, often the sense, often both, by which the children are impressed. The child repeats them because they seem to him strange or very sonorous." (Kussmaul.)

Bradyphrasia.—The speech of people that are sad or sleepy, and of others whose mental processes are indolent, often drags along with tedious slowness; is also liable to be broken off abruptly. The speaker comes to a standstill. This is not to be confounded with bradyphasia or with bradyarthria or bradylalia (see above).

In children likewise the forming of the sentence takes a long time on account of the as yet slow rise and combination of ideas, and a simple narrative is only

slowly completed or not finished at all, because the intellectual processes in the brain are too fatiguing.

Paraphrasia.—Under the same circumstances as in the case of bradyphrasia the (slow) speech may be marred and may become unintelligible because the train of thought is confused—e. g., in persons "drunk" with sleep—so that words are uttered that do not correspond to the original ideas.

In the case of children who want to tell something, and who begin right, the story may be interrupted easily by a recollection, a fresh train of thought, and still they go on; e. g., they mix up two fairy tales, attaching to the beginning of one the end of another.

Skoliophrasia.—Distracted and timid feeble-minded persons easily make mistakes in speaking, because they can not direct their attention to what they are saying and to the way in which they are saying it, but they wander, allowing themselves to be turned aside from the thing to be said by all sorts of ideas and external impressions; and, moreover, they do not notice afterward that they have been making mistakes (cf. p. 53).

Children frequently put a wrong word in place of a right one well known to them, without noticing it. They allow themselves to be turned aside very easily from the main point by external impressions and all sorts of fancies, and often, in fact, say the opposite of what they mean without noticing it.

III. DYSMIMIA.

Disturbances of Gesture-Language (Pantomime).

Perceptive Asemia.—Patients have lost the ability to *understand* looks and gestures (Steinthal).

Children can not yet understand the looks and gestures of persons about them.

Amnesic Amimia.—Aphasic persons can sometimes imitate gestures, but can not execute them when bid, but only when the gestures are made for them to imitate. Children that do not yet speak can imitate gestures if these are made for them to see, but it is often a long time before they can make them at the word of command.

Ataxic Dysmimia and Amimia (*Mimetic Asemia*).—Patients can *no longer* execute significative looks and gestures, on account of defective co-ordination.

Children can not express their states of desire, etc., because they do *not yet* control the requisite co-ordination for the corresponding looks and gestures.

Paramimia (*Paramimetic Asemia*).—Many patients can make use of looks and gestures, but confound them.

Children have not yet firmly impressed upon them the significance of looks and gestures; this is shown in their interchanging of these; e. g., the head is shaken in the way of denial when they are affirming something.

Emotive Language (*Affectsprache*) *in Aphrasia.*—In Aphrasia it happens that smiling, laughing, and weeping are *no longer* controlled, and that they break out on the least occasion with the greatest violence, like the spinal reflexes in decapitated animals. (Hughlings-Jackson.)

Emotive language may continue when the language of ideas (Begriffssprache) is completely extinguished, and idiotic children without speech can even sing.

In children, far slighter occasions suffice normally

to call forth smiles, laughter, and tears, than in adults. These emotional utterances are *not yet* often voluntarily inhibited by the child that can not yet speak; on the contrary, they are unnecessarily repeated.

Apraxia.—Many patients are *no longer* in condition, on account of disturbed intellect, to make right use of ordinary objects, the use of which they knew well formerly; e. g., they can no longer find the way to the mouth; or they bite into the soap.

Children are *not yet* in condition, on account of deficient practice, to use the common utensils rightly; e. g., they will eat soup with a fork, and will put the fork against the cheek instead of into the mouth.

4. Development of Speech in the Child.

We may now take up the main question as to the condition of the child that is learning to speak, in regard to the development and practicability of the nerve-paths and of the centers required for speech. For the comparison of the disturbances of speech in adults with the deficiencies of speech in the child, on the one hand, and the chronological observation of the child, on the other hand, disclose to us what parts of the apparatus of speech come by degrees into operation. First to be considered are the *impressive* and *expressive* paths in general.

All new-born human beings are deaf or hard of hearing, as has already been demonstrated. Since the hearing but slowly grows more acute during the first days, no utterances of sound at this period can be regarded as responses to any sound-impressions whatever. The first cry is purely reflexive, like the croaking of the

decapitated frog when the skin of his back is stroked (Vol. I, p. 214). The cry is not heard by the newly-born himself and has not the least value as language. It is on a par with the squeaking of the pig just born, the bleating of the new-born lamb, and the peeping of the chick that is breaking its shell.

Upon this first, short season of physiological deaf-mutism follows the period during which crying expresses bodily conditions, feelings such as pain, hunger, cold. Here, again, there exists as yet no connection of the expressive phenomena with acoustic impressions, but there is already the employment of the voice with stronger expiration in case of strong and disagreeable excitations of other sensory nerves than those of general sensation and of the skin. For the child now cries at a dazzling light also, and at a bitter taste, as if the unpleasant feeling were diminished by the strong motor discharge. In any case the child cries because this loud, augmented expiration lessens for him the previously existing unpleasant feelings, without exactly inducing thereby a comfortable condition.

Not until later does a sudden sound-impression, which at first called forth only a start and then a quivering of the eyelids, cause also crying. But this loud sign of fright may be purely reflexive, just like the silent starting and throwing up of the arms at a sudden noise, and has at most the significance of an expression of discomfort, like screaming at a painful blow.

It is otherwise with the first loud response to an acoustic impression *recognized* as new. The indefinable sounds of satisfaction made by the child that hears music for the first time are no longer reflexive, and are not

symptoms of displeasure. I see in this reaction, which may be compared with the howling of the dog that for the first time in his life hears music—I see in this reaction of the apparatus of voice and of future speech, *the first sign of the connection now just established between impressive* (acoustic) and *expressive* (having the character of emotive language) *paths*. The impressive, separately, were long since open, as the children under observation after the first week allowed themselves to be quieted by the singing of cradle-songs, and the expressive, separately, must likewise have been open, since various conditions were announced by various sorts of crying.

Everything now depends on a well-established *intercentral communication* between the two. This is next to be discussed.

The primitive connection is already an advance upon that of a reflex arc. The sound-excitations arriving from the ear at the central endings of the auditory nerve are not directly transformed into motor excitations for the laryngeal nerves, so that the glottis contracts to utter vocal sound. When the child (as early as the sixth to the eighth week) takes pleasure in music and laughs aloud, his voice can not in this case (as at birth) have been educed by reflex action, for without a cerebrum he would not laugh or utter joyous sounds, whereas even without that he cries.

From this, however, by no means follows the existence of a speech-center in the infant. The fact that he produces sounds easily articulated, although without choice, like *tahu* and *amma*, proves merely the functional capacity of the peripheral apparatus of articulation (in the seventh week) at a period long before it is inten-

tionally used for articulation. The unintentionally uttered syllables that make their appearance are, to be sure, simple, at least in the first half-year. It is vowels almost exclusively that appear in the first month, and these predominate for a long time yet. Of the consonants in the third month *m* alone is generally to be noted as frequent. This letter comes at a later period also, from the raising and dropping of the lower jaw in expiration, an operation that is besides soon easy for the infant with less outlay of will than the letter *b*, which necessitates a firmer closing of the lips.

But in spite of the simplicity of all the vocal utterances and of the defectiveness of the articulatory apparatus, the child is able (often long before the seventh month) to respond to address, questions, chiding, either with inarticulato sounds or with vowels or by means of simple syllables, like *pa*, *ta*, *ma*, *na*, *da*, *mä*, *mö*, *gö*, *rö* [*a* as in *father;* ä as in *fate;* ö like *i* in *bird.*] Since these responses are entirely, or almost entirely, lacking in microcephali and in children born deaf, they are not purely reflexive, like sneezing, e. g.; therefore there must be in the case of these a cerebral operation also, simple indeed, but indubitably intellectual, interposed between sound-perception and vocal utterance, especially as the infant behaves differently according to what he hears, and he discriminates very well the stern command from the caress, forbidding from allowing, in the voice of the person speaking to him. Yet it is much more the *timbre*, the accent, the pitch, the intensity of the voice and the sounds, the variation of which excites attention, than it is the spoken word. In the first half-year the child hears the vowels much

better than he does the consonants, and will imperfectly understand or divine the sense of a few sounds only—e. g., when his name is uttered in a threatening tone he will hear merely the accented vowel, for at the first performance taught him, purposely postponed to a very late period (in his thirteenth month), it made no difference to my child whether we asked without changing a feature, "Wie gross?" (how tall?) or "ooss?" or "oo?" In all three cases he answered with the same movement of the hand.

Now, although all infants in normal condition, before they can repeat anything after others or can understand any word whatever, *express* their feelings by various sounds, even by syllables, and *distinguish* vowels and many consonants in the words spoken to them, yet this does not raise them above the intelligent animal. The response to friendly address and loud chiding by appropriate sounds is scarcely to be distinguished as to its psychical value from the joyous barking and whining of the poodle.

The pointer-dog's understanding of the few spoken utterances that are impressed upon him in his training is also quite as certain at least as the babe's understanding of the jargon of the nurse. The correctly executed movements or arrests of movement following the sound-impressions "Setz dich! Pfui! Zurück! Vorwärts! Allez! Fass! Apporte! Such! Verloren! Pst! Lass! Hierher! Brav! Leid's nicht! Ruhig! Wahr Dich! Hab Acht! Was ist das! Pfui Vogel! Pfui Hase! Halt!" prove that the bird-dog understands the meaning of the sounds and syllables and words heard as far as he needs to understand them. The training in the

English language accomplishes the same result with "Down! Down charge! Steady! Toho! Fetch! Hold up!" as the training in the French language, with yet other words—so that we can by no means assume any hereditary connection whatever between the quality of the sound heard and the movement or arrest of movement to be executed, such as may perhaps exist in the case of the chick just hatched which follows the clucking of the hen. Rather does the dog learn afresh in every case the meaning of the words required for hunting, just as the speechless child comprehends the meaning of the first words of its future language without being able to repeat them himself—e. g., "Give! Come! Hand! Sh! Quiet!" Long before the child's mechanism of articulation is so far developed that these expressions can be produced by him, the child manifests his understanding of them unequivocally by corresponding movements, by gestures and looks, by obedience.

No doubt this behavior varies in individual cases, inasmuch as in some few the imitative articulation may be to some extent earlier developed than the understanding. There are many children who even in their first year have a monkey-like knack at imitation and repeat all sorts of things like parrots without guessing the sense of them. Here, however, it is to be borne in mind that such an echo-speech appears only after the *first* understanding of some spoken word can be demonstrated; in no case before the fourth month. Lindner relates that when he one day observed that his child of eighteen weeks was gazing at the swinging pendulum of the house-clock, he went with him to it, saying, "Tick-tack," in time with the pendulum; and when he

afterward called out to the child, who was no longer looking at the clock, "Tick-tack!" this call was answered, at first with delay, a little later immediately, by a turning of the look toward the clock. This proved that there was understanding long before the first imitation of words. Progress now became pretty rapid, so that at the end of the seventh month the questions, "Where is your eye? ear? head? mouth? nose? the table? chair? sofa?" were answered correctly by movements of hand and eyes. In the tenth month this child for the first time himself used a word as a means of effecting an understanding, viz., *mama* (soon afterward, indeed, he called both parents *papa*). The child's inability to repeat distinctly syllables spoken for him is not to be attributed, shortly before the time at which he succeeds in doing it, to a purely psychical adynamy (impotence), not, as many suppose, to "being stupid," or to a weakness of will without organic imperfections determined by the cerebral development, for the efforts, the attention, and the ability to repeat incorrectly, show that the will is not wanting. Since also the peripheral impressive acoustic and expressive phonetic paths are intact and developed, as is proved by the acuteness of the hearing and the spontaneous formation of the very syllables desired, the cause of the inability to repeat correctly must be solely organic-centro-motor. The connecting paths between the sound-center and the syllable-center, and of both these with the speech motorium, are not yet or not easily passable; but the imitation of a single sound, be it only *a*, can not take place without the mediation of the cerebral cortex. Thus in the very first attempt to repeat something heard there

exists an unquestionable advance in brain development; and the first successful attempt of this kind proves not merely the augmented functional ability of the articulatory apparatus and of the sound-center, and the practicability of the impressive paths that lead from the ear to the sound-center—it proves, above all, the establishment of intercentral routes that lead from the sound-center and the syllable-center to the motorium.

In fact, the correct *repeating* of a sound heard, of a syllable, and, finally, of a word pronounced by another person, is the surest proof of the establishment and practicability of the entire impressive, central, and expressive path. It, however, proves nothing as to the *understanding* of the sound or word heard and faultlessly repeated.

As the term "understanding" or "understand" is ambiguous, in so far as it may relate to the ideal content (the meaning), and at the same time to the mere perception of the word spoken (or written or touched)—e. g., when any one speaks indistinctly so that we do not "understand" him—it is advisable to restrict the use of this expression. *Understand* shall in future apply only to the *meaning* of the word; *hear*—since it is simply the perceiving of a word through the hearing that we have in view—will relate to the sensuous impression. It is clear, then, that all children who can hear but can not yet speak, repeat many words without understanding them, and understand many words without being able to repeat them, as Kussmaul has already observed. But I must add that the repeating of what is not understood begins only after some word (even one that can not be repeated) has been understood.

Now it is certain that the majority, if not all, of

the children that have good hearing develop the understanding more at first, since the impressive side is practiced more and sooner than the expressive-articulatory. Probably those that imitate early and skillfully are the children that can speak earliest, and whose cerebrum grows fastest but also soonest ceases to grow; whereas those that imitate later and more sparingly, generally learn to speak later, and will generally be the more intelligent. For with the higher sort of activity goes the greater growth of brain. While the other children cultivate more the centro-motor portion, the sensory, the intellectual, is neglected. In animals, likewise, a brief, rapid development of the brain is wont to go along with inferior intelligence. The intelligence gets a better development when the child, instead of repeating all sorts of things without any meaning, tries to guess the meaning of what he hears. Precisely the epoch at which this takes place belongs to the most interesting in intellectual development. Like a pantomimist, the child, by means of his looks and gestures, and further by cries and by movements of all sorts, gives abundant evidence of his understanding and his desires, without himself speaking a single word. As the adult, after having half learned a foreign language from books, can not speak (imitate) it, and can not easily understand it when he hears it spoken fluently by one that is a perfect master of it, but yet makes out *single* expressions and understands them, and divines the meaning of the whole, so the child at this stage can distinctly hear single words, can grasp the purport of them, and divine correctly a whole sentence from the looks and gestures of the speaker, although the child himself makes audible no articulate

utterance except his own, for the most part meaningless, variable babble of sounds and syllables and outcries.

The causes of the slowness of the progress in expressing in articulate words what is understood and desired, on the part of normal children, is not, however, to be attributed, as it has often been, to a slower development of the expressive motor mechanism, but must be looked for in the difficulty of establishing the connection of the various central storehouses of sense-impressions with the intercentral path of connection between the acoustic speech-centers and the speech-motorium. For the purely peripheral articulatory acts are long since perfect, although as yet a simple "*a*" or "*pa*" can not be repeated after another person; for these and other sounds and syllables are already uttered correctly by the child himself.

The order of succession in which these separate sounds appear, without instruction, is very different in individual cases. With my boy, who learned to speak rather late, and was not occupied with learning by heart, the following was the order of the perfectly pure sounds heard by me:

On the left are the sounds or syllables indicated by one letter; on the right, the same indicated by more than one letter; and it is to be borne in mind that the child needs to pronounce only fourteen of the nineteen so-called consonants of the German alphabet in order to master the remaining five also; for

c = ts and k
v = f and w
x = ks and gs
q = ku and kw
z = ts and ds

and of the fourteen four require no new articulation, because

p is a toneless b
t is a toneless d
f is a toneless w
k is a toneless g

Of the ten positions of the mouth required for all the consonants of the alphabet, nine are taken by the child within the first six months :*

Months.	
1. Indefinite vowels; ä u,	uä.
2. a, ö, o; m, g, r, t; h,	am, ma, ta, hu, ör, rö, ar, ra, gö.
3. i; b, l, n,	ua, oa, ao, ai, e͡i, oä, äo, äa, äö; öm, in, ab, om; la, ho, mö, nä, na, ha, bu; ng, mb, gr.
4. e,	a͡u, a-u, aö, ea; an; na, tö, la, me; nt.
5. ü (y); k,	ag, eg, ek, ge, kö.
6. j; the lingual-labial sound,	oi (e͡u, a͡u), io, öe, eu (French); ij, aj, ög, ich; ja, jä; rg, br, ch.
7. d, p,	äe, ui; mä.
8.	eö, aë, ou, a͡u; up; hö, mi, te.
9.	ap, ach, äm; pa, ga, cha.
10.	el, ab, at, ät; dä, ba, ta, tä; nd.
11.	ad, al, ak, er, ej, öd; da, gä, bä, ka, ke, je, he, ne; pr, tr.
12. w,	än, op, ew, är; de, wä; nj, ld.
13. s (ss),	en; hi; dn.
14.	mu; kn, gn, kt.
15. z,	oö, öa, is, iss, es, ass, th (English), ith (Engl.), it; hä, di, wa, sse.
16. f (v),	ok, on; do, go; bw, fp.
17.	ib, öt, än; bi.
18.	äi, iä; äp, im; tu, pä; ft.
19.	ön, et, es; sa, be; st, tth (Engl.), s-ch, sj.

* Pronounce the letters in the tabular view as in German.

Months.	
20.	ub, ot, id, od, oj, uf, ät; bo, ro, jo; dj, dth (Engl.).
21.	öp; fe; rl, dl, nk, pt.
22.	ol; lo; ps, pt, tl, sch, tsch, pth (Engl.).
23. q,	uo; id, op, um, em, us, un, ow, ed, uk, ig, il; jö, ju, po, mo, wo, fa, fo, fi, we, ku (qu), li, ti; tn, pf, gch, gj, tj, schg.
24.	ut, esch; pu, wi, schi, pi.
25.	oë, ul, il, och, iw, ip, ur; lt, rb, rt.
26.	nl, ds, mp, rm, fl, kl, nch, ml, dr.
27. x,	kch, cht, lch, ls, sw, sl.

Every such chronological view of the sequence of sounds is uncertain, because we can not observe the child uninterruptedly, and hence the first appearance of a new sound easily escapes notice. The above synopsis has a chronological value only so far as this, that it announces, concerning every single sound, that such sound was heard in its purity by me at least as early as the given month. The sound may, however, have been uttered considerably earlier without my hearing it. I know from personal experience that in other children many sounds appear much earlier; in my child, e. g., *ngä* was observed too late, and I have no doubt that the first utterance of *f* and *w* was unobserved, although I was on the lookout for them. When it is maintained, on the contrary, that *m* is not heard from a normal child until the tenth month, then the *am* and *mö* which appear universally in the first half-year have escaped notice. Earlier tabular views of this sort, which have even served as a foundation for instruction of deaf-mutes in speaking, do not rest exclusively on observation. Besides, in this matter, even two children hardly agree. According to my observations, I am compelled in spite of this disagreement to lay down the proposition as valid for all

healthy children, that the greatly *preponderating majority of the sounds the child makes use of after learning verbal language, and many other sounds besides these, are correctly formed by him within the first eight months*, not intentionally, but just as much at random as any other utterance of sound not to be used later in speech, not appearing in any civilized language. I will only mention as an example the labio-lingual explosive sound, in which the tip of the tongue comes between the lips and, with an expiration, bursting from its confinement is drawn back swiftly (with or without tone). All children seem to like to form this sound, a sound between *p*, *b*, and *t*, *d*; but it exists in few languages.

Among the innumerable superfluous, unintentional, random, muscular movements of the infant, the movements of the muscles of the larynx, mouth, and tongue take a conspicuous place, because they ally themselves readily with acoustic effects and the child takes delight in them. It is not surprising, therefore, that precisely those vibrations of the vocal cords, precisely those shapings of the cavity of the mouth, and those positions of the lips, often occur which we observe in the utterance of our vowels, and that among the child-noises produced unconsciously and in play are found almost all our consonants and, besides, many that are used in foreign languages. The plasticity of the apparatus of speech in youth permits the production of a greater abundance of sounds and sound-combinations than is employed later, and not a single child has been observed who has, in accordance with the principle of the least effort (*principe du moindre effort*) applied by French authors to this province, advanced in regular sequence from the

sounds articulated easily—i. e., with less activity of will —to the physiologically difficult; rather does it hold good for all the children I have observed, and probably for all children that learn to speak, that many of the sounds uttered by them at the beginning, in the speechless season of infancy, without effort and then forgotten, have to be learned afresh at a later period, have to be painstakingly acquired by means of imitation.

Mobility and perfection in the *technique* of sound-formation are not speech. They come into consideration in the process of learning to speak as facilitating the process, because the muscles are perfected by previous practice; but the very first attempts to imitate voluntarily a sound heard show how slight this advantage is. Even those primitive syllables which the child of himself often pronounces to weariness, like *da*, he can not at the beginning (in the tenth month in my case) as yet say after any one, although he makes manifest by his effort—a regular strain—by his attention, and his unsuccessful attempts, that he would like to say them, as I have already mentioned. The reason is to be looked for in the still incomplete development of the sensori-motor central paths. In place of *tatta* is sounded *tä* or *ata;* in place of *papa* even *taï*, and this not once only, but after a great many trials repeated again and again with the utmost patience. That the sound-image has been correctly apprehended is evident from the certainty with which the child responds correctly in various cases by gestures to words of similar sound unpronounceable by him. Thus, he points by mistake once only to the mouth (Mund) instead of the moon (Mond), and points correctly to the ear (Ohr) and the clock (Uhr) when

asked where these objects are. The acuteness of hearing indispensable for repeating the sounds is therefore present before the ability to repeat.

On the whole, the infant or the young child already weaned must be placed higher at this stage of his mental development than a very intelligent animal, but not on account of his knowledge of language, for the dog also understands very well single words in the speech of his master, in addition to hunting-terms. He divines, from the master's looks and gestures, the meaning of whole sentences, and, although he has not been brought to the point of producing articulate sounds, yet much superior in this respect is the performance of the cockatoo, which learns all articulate sounds. A child who shows by looks and gestures and actions that he understands single words, and who already pronounces correctly many words by imitation without understanding them, does not on this account stand higher intellectually than a sagaciously calculating yet speechless elephant or an Arabian horse, but because he already forms many more and far more complex concepts.

The animal phase of intellect lasts, in the sound, vigorous, and not neglected child, to the end of the first year of life at the farthest; and long before the close of this he has, by means of the *feelings* of pleasure and of discomfort, very definitely distinguishable by him even in the first days of life, but for which he does not get the verbal expressions till the second and third year, formed for himself at least in one province, viz., that of food, *ideas* more or less well defined. Romanes also rightly remarks that the *concept* of food arises in us through the feeling of hunger quite inde-

pendently of language. Probably this concept is the very first that is formed by the quite young infant, only he would not name it "food," if indeed he named it at all, but would understand by it everything that puts an end to the feeling of hunger. It is of great importance to hold firmly to this fact of the origination of ideas, and that not of sensuous percepts only but of concepts, without language, because it runs contrary to prevailing assumptions.

He who has conscientiously observed the mental development of infants must come to the conclusion that *the formation of ideas is not bound up with the learning of words, but is a necessary prerequisite for the understanding of the words to be learned first, and therefore for learning to speak.* Long before the child understands even a single word, before he uses a single syllable consistently with a definite meaning, he already has a number of ideas which are expressed by looks and gestures and cries. To these belong especially ideas gained through touch and sight. Associations of objects touched and seen with impressions of taste are probably the first generators of concepts. The child, still speechless and toothless, takes a lively interest in bottles; sees, e. g., a bottle that is filled with a white opaque liquid (Goulard water), and he stretches out his arms with desire toward it, screaming a long time, in the belief that it is a milk-bottle (observed by me in the case of my child in the thirty-first week). The bottle when empty or when filled with water is not so long attractive to him, so that the idea of food (or of something to drink, something to suck, something sweet) must arise from the sight of a bottle with certain contents without

the understanding or even utterance of any words. The formation of concepts without words is actually demonstrated by this; for the speechless child not only perceived the points of identity of the various bottles of wine, water, oil, the nursing-bottle and others, the sight of which excited him, but he united in one notion the contents of the different sorts of bottles when what was in them was white—i. e., he had separated the concept of food from that of the bottle. Ideas are thus independent of words.

Certain as this proposition is, it is not, however, supported by the reasons given for it by Kussmaul, viz., that one and the same object is variously expressed in various languages, and that a new animal or a new machine is known before it is named; for no one desires to maintain that certain ideas are *necessarily* connected with certain words, without the knowledge of which they could not arise—it is maintained only that ideas do not exist without words. Now, any object has some appellation in each language, were it only the appellation "object," and a new animal, a new machine, is already called "animal," "machine," before it receives its special name. Hence from this quarter the proof can not be derived. On the other hand, the speechless infant certainly furnishes the proof, which is confirmed by some observations on microcephalous persons several years old or of adult age. The lack of the power of abstraction apparent in these persons and in idiots is not so great that they have not developed the notion "food" or "taking of food."

Indeed, it is not impossible that the formation of ideas may continue after the total loss of word-memory,

as in the remarkable and much-talked-of case of Lordat. Yet this case does not by any means prove that the formation of concepts of the *higher* order is possible without previous mastery of verbal language; rather is it certain that concepts rising above the lowest abstractions can be formed only by him who has thoroughly learned to speak: for intelligent children without speech are acquainted, indeed, with more numerous and more complex ideas than are very sagacious animals, but not with many more abstractions of a higher sort, and where the vocabulary is small the power of abstraction is wont to be as weak in adults as in children. The latter, to be sure, acquire the words for the abstract with more difficulty and later than those for the concrete, but have them stamped more firmly on the mind (for, when the word-memory fails, proper names and nouns denoting concrete objects are, as a rule, first forgotten). But it would not be admissible, as I showed above, to conclude from this that no abstraction at all takes place without words. To me, indeed, it is probable that in the most intense thought the most abstract conceptions are effected most rapidly without the disturbing images of the sounds of words, and are only supplementarily clothed in words. In any case the intelligent child forms many concepts of a lower sort without any knowledge of words at all, and he therefore performs abstraction without words.

When Sigismund showed to his son, not yet a year old and not able to speak a word, a stuffed woodcock, and, pointing to it, said, "Bird," the child directly afterward looked toward another side of the room where there stood upon the stove a stuffed white owl, repre-

sented as in flight, which he must certainly have observed before. Here, then, the concept had already arisen; but how little specialized are the first concepts connected with words that do not relate to food is shown by the fact that in the case of Lindner's child (in the tenth month) *up* signified also *down*, *warm* signified also *cold*. Just so my child used *too much* also for *too little;* another child used *no* also for *yes;* a third used *I* for *you*. If these by no means isolated phenomena rest upon a lack of differentiation of the concepts, "then the child already has a presentiment that opposites are merely the extreme terms of the same series of conceptions" (Lindner), and this before he can command more than a few words.

But to return to the condition of the normal child, as yet entirely speechless. It is clear that, being filled with desire to give expression in every way to his feelings, especially to his needs, he will use his voice, too, for this purpose. The adult likewise cries out with pain, although the "Oh!" has no direct connection with the pain, and there is no intention of making, by means of the outcry, communication to others. Now, before the newly-born is in condition to seek that which excites pleasure, to avoid what excites displeasure, he cries out in like fashion, partly without moving the tongue, partly with the sound *ä* dominant, repeated over and over monotonously till some change of external conditions takes place. After this the manner of crying begins to vary according to the condition of the infant; then come sounds clearly distinguishable as indications of pleasure or displeasure; then syllables, at first to some extent spontaneously articulated without mean-

ing, afterward such as express desire, pleasure, etc.; not until much later imitated sounds, and often the imperfect imitation of the voices of animals, of inorganic noises, and of spoken words. The mutilation of his words makes it seem as if the child were already inventing new designations which are soon forgotten; and as the child, like the lunatic, uses familiar words in a new sense after he has begun to learn to talk, his style of expression gets an original character, that of "baby-talk." Here it is characteristic that the feelings and ideas do not now first *arise*, though they are now first articulately expressed; but they were in part present long since and did not become articulate, but were expressed by means of looks and gestures. In the adult ideas generate new words, and the formation of new words does not cease so long as thinking continues; but in the child without speech new feelings and new ideas generate at first only new cries and movements of the muscles of the face and limbs, and, the further we look back into child-development proper, the greater do we find the number of the conditions expressed by one and the same cry. The organism as yet has too few means at its disposal. In many cases of aphasia every mental state is expressed by one and the same word (often a word without meaning). Upon closer examination it is found, however, that for the orator also, who is complete master of speech, all the resources of language are insufficient. No one, e. g., can name all the colors that may be perceived, or describe pain, or describe even a cloud, so that several hearers gain the same idea of its form that the speaker has. The words come short, but the idea is clear. If words sufficed to express clearly

clear conceptions, then the greater part of our philosophical and theological literature would not exist. This literature has its basis essentially in the inevitable fact that different persons do not associate the same concept with the same word, and so one word is used to indicate different concepts (as is the case with the child). If a concept is exceptionally difficult—i. e., exceptionally hard to express clearly in words—then it is wont to receive many names, e. g., "die," and the confusion and strife are increased; but words alone render it possible to form and to make clear concepts of a higher sort. They favor the formation of new ideas, and without them the intellect in man remains in a lower stage of development just because they are the most trustworthy and the most delicate means of expression for ideas. If ideas are not expressed at all, or not intelligibly, their possessor can not use them, can not correct or make them effective. Those ideas only are of value, as a general thing, which continue to exist after being communicated to others. Communication takes place with accuracy (among human beings) only by means of words. It is therefore important to know how the child learns to speak words, and then to use them.

I have above designated, as the chief difficulty for the child in the formation of words, the establishment of a connection between the central storehouse for sense-impressions—i. e., the sensory centers of higher rank—with the intercentral path of connection between the center-for-sounds and the speech-motorium. After the establishment of these connections, and long after ideas have been formed, the sound-image of the word spoken by the mother, when it emerges in the center-for-sounds

directly after the rise of a clear idea, is now repeated by the child accurately, or, in case it offers insurmountable difficulties of articulation for pronunciation, inaccurately. This fact of *sound-imitation* is fundamental. Beyond it we can not go. Especially must be noted here as essential that it appears to be an entirely indifferent matter what syllables and words are employed for the first designation of the child's ideas. Were one disposed to provide the child with false designations, he could easily do it. The child would still connect them logically. If taught further on that two times three are five, he would merely give the *name* five to what is six, and would soon adopt the usual form of expression. In making a beginning of the association of ideas with articulate syllables, such syllables are, as a rule, employed (probably in all languages) as have already been often uttered by the child spontaneously without meaning, because these offered no difficulties of articulation; but only the child's family put meaning into them. Such syllables are *pa*, *ma*, with their doubled form *papa*, *mama*, for "father" and "mother," in connection with which it is to be observed that the meaning of them is different in different languages and even in the dialects of a language. For *mamán*, *mamá*, *máma*, *mamme*, *mammeli*, *mömme*, *mam*, *mamma*, *mammeken*, *memme*, *memmeken*, *mammĕlĕ*, *mammi*, are at the same time child-words and designations for "mother" in various districts of Germany, whereas these and very similar expressions signify also the mother's breast, milk, pap, drink, nursing-bottle; nay, even in some languages the father is designated by *Ma*-sounds, the mother by *Ba*- and *Pa*-sounds.

It is very much the same with other primitive syllables of the babe's utterance, e. g., *atta*. Where this does not denote the parents or grandparents it is frequently used (*táta*, *tatta*, *tatá*, also in England and Germany) in the sense of "gone" ("fort") and "good-by."

These primitive syllables, *pa-pa*, *ma-ma*, *tata* and *apa*, *ama*, *ata*, originate of themselves when in the expiration of breath the passage is stopped either by the lips (*p*, *m*) or by the tongue (*d*, *t*); but after they have been already uttered many times with ease, without meaning, at random, the mothers of all nations make use of them to designate previously existing ideas of the child, and designate by them what is most familiar. Hence occurs the apparent confounding of "milk" and "breast" and "mother" and "(wet-) nurse" or "nurse" and "bottle," all of which the child learns to call *mam*, *amma*, etc.

But just at this period appears a genuine echolalia, the child, unobserved, repeating correctly and like a machine, often in a whisper, all sorts of syllables, when he hears them at the end of a sentence. The normal child, before he can speak, repeats sounds, syllables, words, if they are short, "mechanically," without understanding, as he imitates movements of the hands and the head that are made in his sight. Speaking is a movement-making that invites imitation the more because it can be strictly regulated by means of the ear. Anything more than regulation is not at first given by the sense of hearing, for those born deaf also learn to speak. They can even, like normal children, speak quite early in dreams (according to Gerard van Asch).

Those born deaf, as well as normal children, when one turns quietly toward them, often observe attentively the lips (and also touch them sometimes) and the tongue of the person speaking; and this visual image, even without an auditory image, provokes imitation, which is made perfect by the combination of the two. This combination is lacking in the child born blind, pure echolalia prevailing in this case; in the one born deaf, the combination is likewise wanting, the reading-off of the syllables from the mouth coming in as a substitute. With the deaf infant the study of the mouth-movements is, as is well known, the only means of understanding words spoken aloud, and it is sight that serves almost exclusively for this, very rarely touch; and the child born deaf often repeats the visible movements of lips and tongue better than the hearing child that can not yet talk. It is to be observed, in general, that the hearing child makes less use, on the whole, of the means of reading-off from the mouth than we assume, but depends chiefly on the ear. I have always found, too, that the child has the greatest difficulty in imitating a position of the mouth, in case the sound belonging to it is not made, whereas he easily achieves the same position of the mouth when the acoustic effect goes along with it.

Accordingly, the connection between the ear and the speech-center must be shorter or more practicable in advance (hereditarily) than that between the eye and the speech-center. With regard to both associations, however, the gradually progressive shortening or consolidating is to be distinguished in space and time. With the child that does not yet speak, but is beginning

to repeat syllables correctly and to associate them with primitive ideas, the act of imitation takes longer than with the normal adult, but the paths in the brain that he makes use of are shorter, absolutely and relatively—absolutely, because the whole brain is smaller; relatively, because the higher centers, which at a later period perform their functions with consciousness and accessory ideas, are still lacking. Notwithstanding this, the time is longer than at a later period—often amounting to several seconds—because the working up of what has been heard, and even the arrangement of it in the center for sound-images, and of what has been seen in the center for sight-images, takes more time apart from a somewhat less swift propagation of the nerve-excitement in the peripheral paths. The child's imitation can not be called fully conscious or deliberate. It resembles the half-conscious or unconscious imitation attained by the adult through frequent repetition—i. e., through manifold practice—and which, as a sort of reminiscence of conscious or an abbreviation of deliberate imitation, results from frequent continuous use of the same paths. Only, the child's imitations last longer, and especially the reading-off from the mouth. The child can not distinguish the positions of the mouth that belong to a syllable, but can produce them himself very correctly. He is like the patients that Kussmaul calls "word-blind," who can not, in spite of good sight, read the written words they see, but can express them in speech and writing. For the same word, e. g., *atta*, which the child does not read off from the mouth and does not repeat, he uses himself when he wants to be taken out; thus the inability is not expressive-motor,

but central or intercentral. For the child can already see very well the movement of mouth and tongue; the impressive sight-path has been long established.

Herein this sort of word-blindness agrees fully with the physiological word-deafness of the normal child without speech, whose hearing is good. For he understands wrongly what he hears, when, e. g., in response to the order, "No! no!" he makes the affirmative movement of the head, although he can make the right movement very well. Here too, then, it is not centrifugal and centripetal peripheral lines, but intercentral paths or centers, that are not yet sufficiently developed—in the case of my child, in the fourteenth month. The path leading from the word-center to the dictorium, and the word-center itself, must have been as yet too little used.

From all this it results, in relation to the question, how the child comes to learn and to use words, that in the first place he has ideas; secondly, he imitates sounds, syllables, and words spoken for him; and, thirdly, he associates the ideas with these. E. g., the idea "white + wet + sweet + warm" having arisen out of frequent seeing, feeling, and tasting of milk, it depends upon what primitive syllable is selected for questioning the hungry infant, for talking to him, or quieting him, whether he expresses his desire for food by *möm*, *mimi*, *nana*, *ning*, or *maman*, or *mäm*, or *mem*, or *mima*, or yet other syllables. The oftener he has the idea of food (i. e., something that banishes hunger or the unpleasant feeling of it), and at the same time the sound-impression "milk," so much the more will the latter be associated with the former, and in

consideration of the great advantages it offers, in being understood by all, will finally be adopted. Thus the child learns his first words. But in each individual case the first words acquired in this manner have a wider range of meaning than the later ones.

By means of pure echolalia, without associating ideas with the word babbled in imitation, the child learns, to be sure, to articulate words likewise; but he does not learn to understand them or to use them properly unless coincidences, intentional or accidental, show him this or that result when this or that word is uttered by him. If the child, e. g., hearing the new word "Schnee," says, as an echo, *nee*, and then some one shows him actual snow, the meaningless *nee* becomes associated with a sense-intuition; and later, also, nothing can take the place of the intuition—i. e., the direct, sensuous perception—as a means of instruction. This way of learning the use of words is exactly the opposite of that just discussed, and is less common because more laborious. For, in the first case, the idea is first present, and only needs to be expressed (through hearing the appropriate word). In the second case, the word comes first, and the idea has to be brought in artificially. Later, the word, not understood, awakens curiosity, and thereby generates ideas. But this requires greater maturity.

The third way in which the first words are learned is this: The idea and the word appear almost simultaneously, as in onomatopoetic designations and interjections. Absolutely original onomatopoetic words are very rare with children, and have not been observed by me except after the children already knew some words. The names of animals, *bow-wow*, *moo-moo*, *peep-peep* (bird),

hotto (horse, from the expression of the carter, "hotthо (*tt*," instead of *Haut* (the skin), i. e., "left," in contrast with "aarr"—*Haar*, *Mähne* (the mane)—i. e., "right"), are spoken for the child by the members of his family. Some names of animals, like *kukuk* (cuckoo), also *kikeriki* (cock) and *kuak* (duck, frog), are probably formed often without having been heard from others, only more indistinctly, by German, English (American), and French children. *Ticktack* (*tick-tick*) has also been repeated by a boy of two years for a watch. On the other hand, *weo-weo-weo* (German, *üio*) for the noise of winding a watch (observed by Holden in a boy of two years) is original. *Hüt*, as an unsuccessful imitation of the locomotive-whistle by my boy of two and a half years, seems also noteworthy as an onomatope independently invented, because it was used daily for months in the same way merely to designate the whistle. The voice of the hen, of the redstart, the creaking of a wheel, were imitated by my child of his own accord long before he could speak a word. But this did not go so far as the framing of syllables. It is not easy in this to trace so clearly the framing of a concept as attaching itself directly to onomatopoetic forms as it is in a case communicated by Romanes. A child that was beginning to talk, saw and heard a duck on the water, and said *quack*. Thereafter the child called, on the one hand, all birds and insects, on the other hand, all liquids, *quack*. Finally, it called all coins also *quack*, after having seen an eagle on a French sou. Thus the child came, by gradual generalization, to the point of designating a fly, wine, and a piece of money by the same onomatopoetic word, although only the first per-

ception contained the characteristic that gave the name.

Another case is reported by Eduard Schulte: A boy of a year and three quarters applied the joyous outcry *ei* (which may be an imitated interjection), modifying it first into *eiz*, into *aze*, and then into *ass*, to his wooden goat on wheels, and covered with rough hide; *eiz*, then, became exclusively a cry of joy; *ass*, the name for everything that moved along—e. g., for animals and his own sister and the wagon; also for everything that moved at all; finally, for everything that had a rough surface. Now, as this child already called all coverings of the head and covers of cans *huta*, when he saw, for the first time, a fur cap, he at once christened it *ass-huta*. Here took place a decided subordination of one concept to another, and therewith a new formation of a word. How broad the comprehensiveness of the concept designated *huta* was, is perceived especially in this, that it was used to express the wish to have objects at which the child pointed. He liked to put all sorts of things that pleased him upon his head, calling them *huta*. Out of the *huta*, for "I should like to have that as a hat," grew, then, after frequent repetition, "I should like that." There was in this case an extension of the narrower concept, after it had itself experienced previously a differentiation, and so a limitation, by means of the suffix *ass*. These examples show how independent of words the formation of concepts is. With the smallest stock of words the concepts are yet manifold, and are designated by the same word when there is a lack of words for the composition of new words, and so for fresh word-formation.

The formation of words out of interjections without imitation has not been observed. Here belongs the *rollu*, *rollolo*, uttered by my boy, of his own accord, on seeing rolling balls or wheels; and (in the twentieth month) *rodi*, *otto*, *rojo*, where the rotation perceived by the child occasions at once the one or the other exclamation containing *l* or *r*. In the case of Steinthal, it was *lu-lulu;* in the case of a boy a year and a half old, observed by Kussmaul, it was *golloh*. In these cases the first interjection is always occasioned by a *noise*, not simply by the sight of things rolling without noise. The interjection must accordingly be styled imitative. A combination of the original—i. e., inborn—interjectional sounds into syllables and groups of syllables, without the assistance of members of the family, and without imitation, for the purpose of communicating an idea, is not proved to exist.

On the whole, the way in which the child learns to speak not merely resembles the way in which he learns at a later period to write, but is essentially completely in accord with it. Here, too, he makes no new inventions. First are drawn strokes and blurs without meaning; then certain strokes are imitated; then signs of sounds. These can not be at once combined into syllables, and even after the combination has been achieved and the written word can be made from the syllables it is not yet understood. Yet the child could see, even before the first instruction in writing or the first attempt at scribbling, every individual letter in the dimensions in which he writes it later. So, too, the speechless child hears every sound before he understands syllables and words, and he understands them before he can speak

them. The child commonly learns reading before writing, and so understands the sign he is to write before he can write it. Yet the sign written by himself is often just as unintelligible to him as the word he himself speaks. The analogy is perfect.

If the first germs of words, after ideas have begun to become clear by means of keener perception, are once formed, then the child fashions them of his own effort, and this often with surprising distinctness; but in the majority of cases the words are mutilated. In the first category belongs the comparative *hocher* for *höher* in the sentence *hocher bauen* (build higher)! (in the third year uttered as a request when playing with building-stones). The understanding of the comparative is plainly manifest in this. When, therefore, the same child in his fifth year, to the improper question, "Whom do you like better, papa or mamma?" answers, "Papa and mamma," we should not infer a lack of that understanding, as many do (e. g., Heyfelder); but the decision is impossible to the child. Just so in the case of the question, "Would you rather have the apple or the pear?"

Other inventions of my child were the verb *messen* for "mit dem Messer schneiden" (to cut with the knife); *schiffern*, i. e., "das Schiff bewegen" (move the ship), for "rudern," (row). And the preference of the weak inflection on the part of all children is a proof that *after* the appropriation of a small number of words through imitation, independent—always logical—changes of formation are undertaken. *Gegebt*, *gegeht*, *getrinkt* (gived, goed, drinked), have never been heard by the child; but "gewebt, geweht, gewinkt" (as in Eng-

lish, waved, wafted, beckoned), have been known to him as models (or other formations corresponding to these). Yet this is by no means to say that every mutilation or transformation the child proposes is a copy after an erroneously selected model; rather the child's imagination has a wide field here and acts in manifold fashion, especially by combinations. "My teeth-roof pains me," said a boy who did not yet know the word "palate." Another in his fourth year called the road (Weg) the "go" (Gehe). A child of three years used the expression, "Just grow me" (*wachs mich einmal*) for "Just see how I have grown" (Sieh einmal wie ich gewachsen bin) (Lindner). Such creations of the childish faculty of combination, arising partly through blending, partly through transference, are collected in a neat pamphlet, "Zur Philosophie der Kindersprache," by Agathon Keber, 1868. The most of them, however, are from a later time of life than that here treated of. So it is with the two "heretical" utterances communicated by Rösch. A child said *unterblatte* (under-leaf) for "Oblate," because he saw the wafer (Oblate) slipped under the leaf of paper (Blatt); and he called the "American chair," "Herr-Decaner-chair," because somebody who was called "Herr Decan" used to sit in it. Here may be seen the endeavor to put into the acoustic impression not understood a meaning. These expressions are not inventions, but they are evidence of intellect. They can not, of course, appear in younger children without knowledge of words, because they are transformations of words.

On the other hand it is of the greatest importance for the understanding of the first stage of the use of

words in their real significance, after the acquirement of them has once begun, to observe how many different ideas the child announces by one and the same verbal expression. Here are some examples: *Tuhl* (for Stuhl, chair) signifies—1. "My chair is gone"; 2. "The chair is broken"; 3. "I want to be lifted into the chair"; 4. "Here is a chair." The child (Steinthal's) says (in the twenty-second month), when he sees or hears a barking dog, *bellt* (barks), and thinks he has by that word designated the whole complex phenomenon, the sight-perception of the dog and of a particular dog, and the sound-perception; but he says *bellt* also when he merely hears the dog. No doubt the memory-image of the dog he has seen is then revived for him.

Through this manifold significance of a word, which is a substitute for a whole sentence, is exhibited a much higher activity of the intellect than appears in the mutilation and new formation of words having but one meaning to designate a sense-impression, for, although in the latter is manifested the union of impressions into perceptions and also of qualities into concepts, wherein an unconscious judgment is involved, yet a *clear* judgment is not necessarily connected with them. The union of concepts into conscious clear judgments is recognized rather in the formation of a sentence, no matter whether this is expressed by one word or by several words.

In connection with this an error must be corrected that is wide-spread. It consists in the assumption that all children begin to speak with nouns, and that these are followed by verbs. This is by no means the case. The child daily observed by me used an adjective for the first time in the twenty-third month in order to ex-

press a judgment, the first one expressed in the language of those about him. He said "hot" for "The milk is too hot." In general, the appropriation and employment of words for the first formation of sentences depends, in the first instance, upon the action of the adults in the company of the child. A good example of this is furnished by an observation of Lindner, whose daughter in her fourteenth month first begged with her hands for a piece of apple, upon which the word "apple" was distinctly pronounced to her. After she had eaten the apple she repeated the request, re-enforcing her gesture this time by the imitated sound *appn*, and her request was again granted. Evidently encouraged by her success, the child from that time on used *appn* for "eat, I want to eat," as a sign of her desire to eat in general, because those about her "accepted this signification and took the word stamped by her upon this concept for current coin, else it would very likely have been lost." This also confirms my statement (p. 85) that a child easily learns to speak with logical correctness with wrong words. He also speaks like the deaf-mute with logical correctness with quite a different arrangement of words from that of his speech of a later period. Thus the child just mentioned, in whom "the inclination to form sentences was manifest from the twenty-second month," said, "hat die Olga getrinkt," when she had drunk!

But every child learns at first not only the language of those in whose immediate daily companionship he grows up, but also at first the peculiarities of these persons. He imitates the accent, intonation, dialect, as well as the word, so that a Thuringian child may be

surely distinguished from a Mecklenburg child even in the second and third year, and, at the same time, we may recognize the peculiarities of the speech of its mother or nurse, with whom it has most intercourse. This phenomenon, the persistence of dialects and of peculiarities of speech in single families, gives the impression, on a superficial observation, of being something inherited; whereas, in fact, nothing is inherited beyond the voice through inheritance of the organic peculiarities of the mechanism of phonation. For everything else completely disappears when a child learns to speak from his birth in a foreign community.

Hereditary we may, indeed, call the characteristic of humanity, speech; hereditary, also, is articulation in man, and the faculty of acquiring any articulate language is innate. But beyond this the tribal influence does not reach. If the possibility of learning to speak words phonetically is wanting because ear or tongue refuses, then another language comes in as a substitute —that of looks, gestures, writing, tactile images—then not Broca's center, but another one is generated. So that the question whether a speech-center already exists in the alalic child must be answered in the negative; the center is formed only when the child hears speech, and, if he does not hear speech, no center is developed. In this case the ganglionic cells of the posterior third of the third frontal convolution are otherwise employed, or they suffer atrophy. In learning to speak, on the contrary, there is a continuous development, first of the sound-center, then of the syllable-center, then of the word-center and the dictorium. The brain grows through its own activity.

CHAPTER XVIII.

FIRST SOUNDS AND BEGINNINGS OF SPEECH IN THE CASE OF A CHILD OBSERVED DAILY DURING HIS FIRST THREE YEARS.

The observations bearing upon the acquirement of speech recorded by me in the case of my boy from the day of his birth, the 23d of November, 1877, are here presented, so far as they appear worthy of being communicated, in chronological order. They are intended to serve as authenticated documents.

The points to which the attention is to be directed in these observations are determined by the organic conditions of the acquirement of speech, which have been treated previously. First, the expressive processes, next the impressive, last the central processes, claim the attention. (1) To the *expressive* beginnings of speech belongs the sum total of the inarticulate sounds—crying, whimpering, grunting, cooing, squealing, crowing, laughing, shouting (for joy), modulation of the voice, smacking, and many others, but also the silent movement of the tongue; further, articulation, especially before imitation begins; the formation of sound, and so the gradual perfecting of the vowels, aspirates, and consonants; at the same time the forming of syllables. The last is especially easy to follow in the babbling monologues of the infant, which are often very long. The reduplication of syllables, accentuation, and inflection, whispering, singing, etc., belong likewise here. (2) The *impressive* processes are discerned in the looks and gestures of the

child as yet speechless; later, the ability to discriminate in regard to words and noises, and the connection of the ear with the speech-center, are discerned in the first imitations of sounds and in the repeating after others—i. e., in word-imitation. Here belong also the onomatopoetic attempts of children, which are simply a sort of imitation. Later, are added to these the answers to simple spoken questions, these answers being partly interjectional, partly articulate, joined into syllables, words, and then sentences. The understanding of words heard is announced especially by the first listening, by the association of certain movements with certain sound-impressions, and of motionless objects with other sound-impressions, before speaking begins. Hereby (3) the *central* processes are already shown to be in existence. The childish logic, especially induction from too few particulars, the mutilation of words reproduced, the wrong applications of expressions correctly repeated, the confounding of opposites in the verbal designation of concepts of the child's own formation, offer an abundance of noteworthy facts for the genesis of mind. Moreover, the memory for sounds and words, the imagination, especially in filling out, as well as the first acts of judging, the forming of propositions, questioning—all these are to be considered. As for the order in which the separate classes of words appear, the training in learning-by-heart, speculations as to which spoken word is first perfectly understood, to these matters I have paid less attention, for the reason that here the differences in the child's surroundings exert the greatest influence. My report must, in any event, as a rough draft of the history of the development of language in

the child, be very imperfect. It, however, contains nothing but perfectly trustworthy matter of my own observation.

During the first weeks the child often cried long and vigorously from discomfort. If one were to try to represent by written vowels the screaming sounds, these would most nearly resemble, in the majority of cases, a short *u* (oo in book), with a very quickly following prolonged *ä* (*aï* in fair); thus, *uä, uä, uä, uä,* were the first sounds that may be approximately expressed. They were uttered after the lapse of five months exactly as at the beginning, only more vigorously. All the other vowel-sounds were at first undefined.

Notwithstanding this uniformity in the vowel-sounds, the sounds of the voice are so varied, even within the first five weeks, that it may be told with certainty from these alone whether the child feels hunger or pain or pleasure. Screaming with the eyes firmly closed in hunger, whimpering in slight indisposition, laughing at bright objects in motion, the peculiar grunting sounds which at a later period are joined with abdominal pressure and with lively arm-movements, as the announcement of completed digestion and of wetness (retained for the first of these states even into the seventeenth month), are manifold acoustic expressions of vitality, and are to be looked upon as the first forerunners of future oral communication, in contrast with the loud-sounding reflex movements of sneezing and of hiccough, and with the infrequent snoring, snuffling (in sucking), and other loud expirations observed in the first days, which have just as little linguistic value as have coughing and the later clearing of the throat.

The voice is very powerful as early as the sixth day, especially when it announces feelings of discomfort. Screaming is much more frequent, persistent, and vigorous also when diluted cow's milk is given instead of that from the breast. If one occupies himself longer than usual with the infant (in the first two months), the child is afterward more inclined to cry, and cries then (as in the case of hunger) quite differently from what he does when giving notice of something unpleasant—e. g., wetness. Directly upon his being made dry, the crying ceases, as now a certain contentment is attained. On the other hand, the inclination to cry serves very early (certainly from the tenth week on) as a sign of well-being (or increase in the growth of the muscles). At least a prolonged silence at this season is wont to be connected with slight ailment. But it is to be remarked that during the whole period no serious illness, lasting more than one day, occurred.

On the forty-third day I heard the *first consonant*. The child, in a most comfortable posture, uttering all sorts of obscure sounds, said once distinctly *am-ma*. Of vowels, *ao* was likewise heard on that day. But, on the following day, the child surprised me and others by the syllables, spoken with perfect distinctness, *ta-hu*.

On the forty-sixth day, in the otherwise unintelligible babble of the infant, I heard, once each, *gö* (*ö* nearly like *i* in bird), *örö*, and, five days later, *ara*.

In the eighth and ninth *weeks*, the two utterances, *örrö*, *arra*, became frequent, the *ö* and *a* being pure and the *r* uvular.

The syllable *ma* I heard by itself (it was during his crying) for the first time on the sixty-fourth day. But

on the following day was sounded, during persistent, loud crying, often and distinctly (it returned in like manner months after), *nei*, *nei*, *nei*, and once, during his babbling, *a-omb*.

On the day after, distinctly, once each, *la*, *grei*, *aho*, and, besides, *ma* again.

On the sixty-ninth day, the child, when hungry, uttered repeatedly and very distinctly, *mömm* and *ngö*.

Of the syllables earlier spoken, only *örrö* is distinctly repeated in the tenth week. On the seventy-first day, the child being in the most comfortable condition, there comes the new combination, *ra-a-ao*, and, five days later, in a hungry and uncomfortable mood, *nä*, and then *nāi-n*.

The manifest sign of contentment was very distinct (on the seventy-eighth day): *habu*, and likewise in the twelfth week *a-i* and *uāo*, as well as *ä-o-a*, alternating with *ä-a-a*, and *o-ä-ö*.

It now became more and more difficult to represent by letters the sounds, already more varied, and even to distinguish the vowels and repeat them accurately. The child cries a good deal, as if to exercise his respiratory muscles. To the sounds uttered while the child is lying comfortably are added in the fourteenth week *ntö*, *ha*. The last was given with an unsually loud cry, with distinct aspiration of the *h*, though with no indication that the child felt any particular pleasure. At this period I heard besides repeatedly *lö*, *na*, the latter along with screaming at disagreeable impressions more and more frequently and distinctly; in the fifteenth week, *nannana*, *nā-nā*, *nanna*, in refusal. On the

other hand, the earlier favorite *örrö* has not been heard at all for some weeks.

Screaming while waiting for his food to be prepared (milk and water) or for the nurse, who had not sufficient nourishment for the child, is marked, in the sixteenth week—as is also screaming on account of unpleasant feelings—in general by predominance of the vowels, *ä-ŭ, ä-ŭ ä, ā-ŭ, ā-ŭ, ŭ-ä, ŭ-ä, ū-ū-ā-ö*, but meantime is heard *amme-a*, and as a sign of special discomfort the persistent ill-sounding *ūă-ūă-ūă-ūă* (*ū* = Eng. *oo*).

Screaming in the first five months expresses itself in the main by the vowels *u, ä, ö, a*, with *ü* and *o* occurring more seldom, and without other consonants, for the most part, than *m*.

In the fifth month no new consonants were developed except *k;* but a merely passive *gö, kö, aggeggĕkö*, the last more rarely than the first, was heard with perfect distinctness during the child's yawning.

While in this case the *g*-sound originates passively, it was produced, in connection with *ö*, evidently by the position of the tongue, when the child was in a contented frame, as happens in nursing; *ögö* was heard in the twenty-second week, as well as *ma-ö-ĕ, hă, ā, ho-ich*. The *i* here appeared more distinct than in the third month. The soft *ch*, which sounded like the *g* in "Honig," was likewise quite distinct.

About this time began the amusing loud "crowing" of the child, an unmistakable expression of pleasure. The strong aspirate sound *ha*, and this sound united with the labial *r* in *brrr-há*, corresponding in force to the voice, which had become exceptionally powerful, must likewise be regarded as expressions of pleasure.

So with the sounds *aja*, *örrgö*, *ā-ā-i-ŏ-ā*, which the child toward the end of the first half-year utters as if for his own gratification as he lies in comfort. With these belongs also the frequently repeated "eu" of the French "heure," and the "œu" of the French "cœur," which is not found in the German language, also the primitive sounds *ä* and *ö* (German). The lips contract very regularly, and are protruded equally in the transition from *ä* to *ö*. I heard also *ijä* cried out by the child in very gay mood. In the babbling and crowing continued often for a long time without interruption, consonants are seldom uttered, pure vowels, with the exception of *a*, less often than *ä* and *ö*; *i* and *u* are especially rare.

When the child lies on his back, he moves his arms and legs in a lively manner even without any external provocation. He contracts and expands all the muscles he can command, among these especially the muscles of the larynx, of the tongue, and of the aperture of the mouth. In the various movements of the tongue made at random it often happens that the mouth is partly or entirely closed. Then the current of air that issues forth in breathing bursts the barrier and thus arise many sounds, among them some that do not exist in the German language, e. g., frequently and distinctly, by means of labio-lingual stoppage, a consonant-sound between *p* and *t* or between *b* and *d*, in the production of which the child takes pleasure, as he does also in the labial *brr* and *m*. By far the greater part of the consonant-sounds produced by the exercises of the tongue and lips can not be represented in print; just as the more prolonged and more manifold movements of

the extremities, movements made by the child when he has eaten his fill, and is not sleepy and is left to himself, can not be drawn or described. It is noteworthy that all the utterances of sound are expiratory. I have not once observed an attempt to form sounds while drawing in the breath.

In the seventh month the child at one time screamed piercingly, in very high tones, from pain. When hungry and desiring milk, he said with perfect distinctness, *mä, ä, ŭä, ŭäĕ;* when contented he would say *örrö* too, as at an earlier period. The screaming was sometimes kept up with great vigor until the child began to be hoarse, in case his desire, e. g., to leave his bed, was not granted. When the child screams with hunger, he draws the tongue back, shortens it and thereby broadens it, making loud expirations with longer or shorter intervals. In pain, on the other hand, the screaming is uninterrupted and the tones are higher than in any other screaming. During the screaming I heard the rare *l* distinctly in the syllable *lä.* The vowels *ŭ-ā-ŭ-i-i* also appeared distinctly, all as if coming by accident, and not often pure. The *t* also was seldom heard; *f, s, sch, st, sp, sm, ts, ks, w,* not once yet; on the other hand, *b, d, m, n, r,* often; *g, h,* more seldom; *k,* only in yawning; *p,* but very rarely, both in screaming and in the child's babble to himself or in response to friendly address.

In the eighth month the screaming sounds were for the most part different from what they had been; the disagreeable screaming no longer so intense and prolonged, from the time that the food of the child consisted exclusively of pap (Kindermehl) and water. Single vowels,

like *u* and *ä*, are very often not to be heard pure. Often the child does not move the lips at all when with mouth shut he lifts and drops the larynx, and with eager desire for the pap howls, or coos like a dove, or grunts. The prattling monologues become longer when the child is alone, lying comfortably in bed. But definite consonants can only with difficulty be distinguished in them, with the exception of *r* in the *örrö*, which still continues to be uttered, though rarely and unintentionally. Once the child, while in the bath, cried out as if yawning, *hā-upp*, and frequently, when merry, *a-e͡i*, *a-a͡u*, *ă-ha͡u-ă*, *hörrö*. When he babbles contentedly in this manner, he moves the tongue quickly, both symmetrically, e. g., raising the edges equally, and asymmetrically, thrusting it forward to right or left. He often also puts out the tongue between the lips and draws it back during expiration, producing thereby the before-mentioned labio-lingual explosive sounds. I also heard *ntĕ-ö*, *mi-ja*, *mija* (*j* like Eng. *y*), and once distinctly *oŭāĕi*.

In the ninth month it is still difficult to recognize definite syllables among the more varied utterances of sound. But the voice, often indeed very loud and inarticulate, is already more surely modulated as the expression of psychical states. When the child, e. g., desires a new, especially a bright object, he not only stretches both arms in the direction of it, indicating the direction by his gaze, but also makes known, by the same sound he makes before taking his food, that he wants it. This complex combination of movements of eye, larynx, tongue, lips, and arm-muscles appears now more and more; and we can recognize in his screaming the desire for a change of position, discomfort

(arising from wet, heat, cold), anger, and pain. The last is announced by screaming with the mouth in the form of a square and by higher pitch. But delight at a friendly expression of face also expresses itself by high crowing sounds, only these are not so high and are not continued long. Violent stretchings of arms and legs accompany (in the thirty-fourth week first) the joyous utterance. Coughing, almost a clearing of the throat, is very rare. Articulate utterances of pleasure, e. g., at music, are *mä-mä, äm-mä, mä.*

Meantime the lip-movements of the *m* were made without the utterance of sound, as if the child had perceived the difference. Other expressions of sound without assignable cause are *ā-au-ā-ā, ā-ŏ, a-u-au, na-na,* the latter not with the tone of denial as formerly, and often repeated rapidly in succession. As separate utterances in comfortable mood, besides *örrö* came *apa, ga-au-ă, acha.*

The tenth month is marked by the increasing distinctness of the syllables in the monologues, which are more varied, louder, and more prolonged when the child is left to himself than when any one tries to entertain him. Of new syllables are to be noted *ndäĕ, bāë-bāë, ba ell, arrö.*

From the forty-second week on, especially the syllables *mä* and *pappa, tatta, appapa, babba, tätä, pa,* are frequently uttered, and the uvular *rrrr, rrra,* are repeated unweariedly. The attempts to make the child repeat syllables pronounced to him, even such syllables as he has before spoken of his own accord, all fail. In place of *tatta* he says, in the most favorable instance, *tä* or *ata ;* but even here there is progress, for in the pre-

vious month even these hints at *imitating* or even responding to sound were almost entirely lacking.

In the eleventh month some syllables emphatically pronounced to the child were for the first time correctly repeated. I said "ada" several times, and the attentive child, after some ineffectual movements of the lips, repeated correctly *ada*, which he had for that matter often said of his own accord long before. But this single repetition was so decided that I was convinced that the *sound-imitation* was intentional. It was the first *unquestionable* sound-imitation. It took place on the three hundred and twenty-ninth day. The same day when I said "mamma," the response was *nanna*. In general, it often happens, when something is said for imitation, and the child observes attentively my lips, that evident attempts are made at imitation; but for the most part something different makes its appearance, or else a silent movement of the lips.

In the forty-fifth week everything said to the child, in case it received his attention, was responded to with movements of lips and tongue, which gave the impression of being made at random and of serving rather for diversion.

Further, at this period the child begins during his long monologues to *whisper*. He produces sounds in abundance, varying in force, pitch, and *timbre*, as if he were speaking an unknown tongue; and some single syllables may gradually be more easily distinguished, although the corresponding positions of the mouth pass into one another, sometimes quite gradually, sometimes rapidly. The following special cases I was able to establish by means of numerous observations:

In crying *rrra*, there is a vibration on both sides of the edges of the tongue, which is bent to a half-cylinder with the ridge upward. In this way the child produces three kinds of *r*-sounds—the labial, the uvular, and this bilateral-lingual.

New syllables of this period are *ta-hêe*, *dann-tee*, *âa-nêe*, *ngä*, *tai*, *bä*, *dall*, *at-tall*, *kamm*, *akkee*, *praï-jer*, *tra*, *ā-hêe*. Among them *tra* and *pra* are noteworthy as the first combination of *t* and *p* with *r*. The surprising combinations *attall* and *akkee* and *praïjer*, which made their appearance singly without any occasion that could be noticed, like others, are probably the first attempts to reproduce the child's own name (Axel Preyer) from memory. Of earlier sounds, syllables, and combinations of these, the following are especially frequent: *Mammam*, *apapa*, *örrö*, *papa*, *tata*, *tatta*, *nâa*, *rrra*, *pata*, *mmm*, *nă*, *ā*, *ä*, *âu*, *anna*, *attapa*, *dadada*, *ja*, *ja-ja*, *eja*, *jaë*. The last syllables are distinguished by the distinct *e*, which is now more frequent.

All the pains taken to represent a babbling monologue perfectly by letters were fruitless, because these distinct and oft-repeated syllables alternated with indistinct loud and soft ones. Still, on the whole, of the consonants the most frequent at this period are *b*, *p*, *t*, *d*, *m*, *n*, and the new *r*; *l*, *g*, *k*, not rare. Of vowels the *a* has a decided preponderance. Both *u* and *o* are rare; *i* very rare. Yet a vowel is not repeated, either by itself or in a syllable, more than five times in succession without an interval. Commonly it is twice or three times. I have also noticed that the mechanical repetition of the same syllable, e. g., *papapa*, occurs far more often than the alternation of a distinctly spoken syllable

with another distinctly spoken one, like *pata*. In the mean time it is certain that the child during his various movements of lips and tongue, along with contraction and expansion of the opening of the mouth, readily starts with surprise when he notices such a change of acoustic effect. It seems as if he were himself taking pleasure in practicing regularly all sorts of symmetrical and asymmetrical positions of the mouth, sometimes in silence, sometimes with loud voice, then again with soft voice. In the combinations of syllables, moreover, palpable accentuation somewhat like this, *appápapa atátata*, is by no means frequent. The surprisingly often repeated *dadada* has generally no accent.

With regard to the question whether in this period, especially important for the development of the apparatus of speech, any articulate utterance of sound stands in firm association with an idea, I have observed the child under the most varied circumstances possible without disturbing him; but I have ascertained only one such case with certainty. The *atta*, *hödda*, *hatta*, *hataï*, showed itself to be associated with the perception that something disappeared, for it was uttered when some one left the room, when the light was extinguished, and the like; also, to be sure, sometimes when such remarkable changes were not discoverable. Thus, the eleventh month ends without any other indubitable firm *association of articulation and idea.*

In the next four weeks, up to the *end of the first year* of life, there was no progress in this respect to record; but, from this time on, an eager desire—e. g., for a biscuit seen, but out of reach—was regularly an-

nounced by *ä-na*, *ä-nananana*, uttered loudly and with an expression of indescribable longing.

The attempts at imitation, too, are somewhat more successful, especially the attention is more strained. When, e. g., in the fifty-first week, I sang something for the child, he gazed fixedly more than a minute, with immovable countenance, without winking, at my mouth, and then moved his own tongue. Correct repetition of a syllable pronounced to him is, however, very rare. When I laugh, and the child observes it, he laughs likewise, and then crows, with strong abdominal pressure. This same loud expression of joy is exhibited when the child unexpectedly sees his parents at a distance. This peculiar pressure, with strong expiration, is in general associated with feelings of pleasure. The child almost seems to delight in the discovery of his own abdominal pressure, when he produces by means of it the very high crowing sounds with the vowel *i* or a genuine grunt.

Of articulate sounds, syllables, and combinations, made without suggestion from others in the twelfth month, I have caught the following particularly with accuracy: *haja*, *jajajajaja*, *aja*, *njaja*, *näin-hopp*, *ha-a*, *pa-a*, *dēwär*, *han-na*, *mömma*, *allda*, *alldaï*, *apa-u-a*, *gägä*, *ka*, *ladn*. Besides, the earlier *atta* variously modified; no longer *dada*.

More important than such almost meaningless sound-formations, among which, by the way, appears for the first time *w*, is the now awakened *ability to discriminate between words heard*. The child turns around when his name is spoken in a loud voice; he does this, it is true, at other loud sounds also, but then with a dif-

ferent expression. When he hears a new tone, a new noise, he is surprised, opens his eyes wide, and holds his mouth open, without moving.

By frequent repetition of the words, "Give the hand," with the holding out of the hand, I have brought the child, in the fifty-second week, to the point of obeying this command of himself—a sure proof that he distinguishes words heard. Another child did the same thing in the seventh month. In this we can not fail to see the beginning of communication by means of ordinary language, but this remained a one-sided affair till past the third half-year, the child being simply receptive. During this whole period, moreover, from birth on, special sounds, particularly "sch (Eng., *sh*), ss, st, pst," just the ones not produced by the child, had a remarkable effect of a quieting character. If the child heard them when he was screaming, he became quiet, as when he heard singing or instrumental music.

In the *first weeks of the second year of life*, the child behaves just as awkwardly as ever in regard to saying anything that is said to him, but his attention has become more lively. When anything is said to him for him to say—e. g., *papa*, *mama*, *atta*, *tatta*—he looks at the speaker with eyes wide open and mouth half open, moves the tongue and the lips, often very slightly, often vigorously, but can not at the same time make his voice heard, or else he says, frequently with an effort of abdominal pressure, *attaï*. Earlier, even in the forty-fifth week, he had behaved in much the same way, but to the word "papa," pronounced to him, he had responded *rrra*. Once only, I remember, *papa* was repeated correctly, in a faint tone, on the three

hundred and sixty-ninth day, almost as by one in a dream. With this exception, no word could be repeated on command, notwithstanding the fact that the faculty of imitation was already active in another department. The syllables most frequently uttered at this stage were *nja*, *njan*, *dada*, *atta*, *mama*, *papaï*, *attaï*, *na-na-na*, *hatta*, *meeně-meeně-meeně*, *mömm*, *mömma*, *ao-u*.

Of these syllables, *na-na* regularly denotes a desire, and the arms are stretched out in connection with it; *mama* is referred to the mother perhaps in the fifty-fourth week, on account of the pleasure she shows at the utterance of these syllables, but they are also repeated mechanically without any reference to her; *atta* is uttered now and then at going away, but at other times also. His joy—e. g., at recognizing his mother at a distance—the child expresses by crowing sounds, which have become stronger and higher than they were, but which can not be clearly designated; the nearest approach to a representation of them is *ăhijă*. Affirmation and negation may already be recognized by the tone of voice alone. The signification of the cooing and the grunting sounds remains the same. The former indicates desire of food; the latter the need of relieving the bowels. As if to exercise the vocal cords, extraordinarily high tones are now produced, which may be regarded as signs of pleasure in his own power. An imperfect language has thus already been formed imperceptibly, although no single object is as yet designated by a sound assigned to it *alone*. The articulation has made progress, for on the three hundred and sixty-eighth day appeared the first distinct *s*, in the syllable *ssi;* quite incidentally, to be sure.

The most important advance consists in the now awakened *understanding of spoken words.* The ability to learn, or the capability of being trained, has emerged almost as if it had come in a night.

For it did not require frequent repetition of the question, "How tall is the child?" along with holding up his arms, in order to make him execute this movement every time that he heard the words, "Wie gross?" ("How tall?") or "ooss," nay, even merely "oo." It was easy, too, to induce him to take an ivory ring, lying before him attached to a thread, into his hand, and reach it to me prettily when I held out my hand and said, "Where is the ring?" and, after it had been grasped, said, "Give." In the same way, the child holds the biscuit, which he is carrying to his mouth, to the lips of the person who says pleasantly to him, "Give"; and he has learned to move his head sidewise hither and thither when he hears "No, no." If we say to him, when he wants food or an object he has seen, "Bitte, bitte" (say "Please"), he puts his hands together in a begging attitude, a thing which seemed at first somewhat hard for him to learn. Finally, he had at this time been taught to respond to the question, "Where is the little rogue?" by touching the side of his head with his hand (a movement he had often made of himself before).

From this it appears beyond a doubt that now (rather late in comparison with other children) the association of words heard with certain movements is established, inasmuch as upon acoustic impressions—at least upon combined impressions of hearing and of sight, which are repeated in like fashion — like movements

follow, and indeed follow invariably with the expression of great satisfaction on the countenance. Yet this connection between the sensorium and the motorium is not yet stable, for there follows not seldom upon a command distinctly uttered, and without doubt correctly understood, the wrong movement—paramimy. Upon the question, "How tall?" the hands are put together for "Please," and the like. Once when I said, "How tall?" the child raised his arms a moment, then struck himself on the temples, and thereupon put his hands together, as if "rogue," and then "please," had been said to him. All three movements followed with the utmost swiftness, while the expression of face was that of a person confused, with wavering look. Evidently the child had *forgotten* which movement belonged with the "tall," and performed all the three tricks he had learned, *confounding* them one with another. This confounding of arm-raising, head-shaking, giving of the ring, putting the hands together, touching the head, is frequent. It is also to be noticed that some one of these five tricks is almost invariably performed by the child when some new command is given to him that he does not understand, as he perceives that something is required of him—the first conscious act of *obedience*, as yet imperfect.

In the fourteenth month there was no great increase in the number of independent utterances of sound that can be represented by syllables of the German language. Surprising visual impressions, like the brilliant Christmas-tree, and the observation of new objects, drew from the pleasurably excited child, without his having touched anything, almost the same sounds that he at

other times made when in discontented mood, *ŭä*, *mŭä*, only softer; *mömö* and *mama*, and also *papa* are frequent expressions of pleasure. When the child is taken away, he often says *ta-ta* loudly, also, *atta* in a whisper. There can no longer be a doubt that in these syllables is now expressed simply the idea of "going." The labial *brrr*, the so-called "coachman's *R*," was practiced by the child, of his own accord, with special eagerness, and indeed was soon pronounced so cleverly that educated adults can not produce it in such purity and especially with so prolonged an utterance. The only new word is *dakku* and *daggn*, which is often uttered pleasantly with astonishing rapidity, in moments of enjoyment, e. g., when the child is eating food that tastes good. But it is also uttered so often without any assignable occasion, that a definite meaning can hardly be attributed to it, unless it be that of satisfaction. For it is never heard when the least thing of a disagreeable sort has happened to the child. The probability is obvious that we have here a case of imitation of the "Thanks" (Danke) which he has not seldom heard. But the modifications *taggn*, *attagn*, *attatn*, pass over into the word, undoubtedly the original favorite, *taï*, *ataï*.

Among all the indistinct and distinct sounds of the babbling monologues, no inspiratory ones appeared at this time either; but such did make their appearance now and then, in a passive manner, in swallowing and in the coughing that followed.

I spent much time in trying to get the child to repeat vowels and syllables pronounced to him, but always without special success. When I said plainly

to him "pá-pá-pá," he answered loudly *ta-taï*, or with manifest effort and a vigorous straining, *t-taï*, *k-taï*, *at-taï*, *hattaï*, and the same when "má-má" was said for him by any one, no matter whom. He also moved lips and tongue often, as if trying to get the sound in various ways; as if the *will* of the child, as he attentively observed the mouth of the speaker, were present, but not the ability to reproduce the sound-impression. Evidently he is taking pains to repeat what he has heard; and he laughs at the unsuccessful effort, if others laugh over it. The earliest success is with the repetition of the vowels "a-u-o," but this is irregular and inaccurate.

In contrast with these halting performances stands the precise, *parrot-like repetition* of such syllables as the child had uttered of his own accord, and which I had immediately after pronounced to him. Thus *attaï*, *taï*, *atta*, were often easily and correctly repeated, but, strangely enough, frequently in a whisper. The *ä-ĕ*, *ä-ö*, *ä-ĕ*, accompanied by oscillatory movements of the hand, when imitated directly by me was also produced again; in like manner, regularly, the *dakkn*, but this course did not succeed in the case of other primitive syllables or words, even under the most favorable circumstances: here it is to be borne in mind that the last-named utterances were precisely the most frequent at this period. When he was requested with emphasis to say *papa*, *mama*, *tata*, he would bring out one of the tricks he had been taught in the previous month; among others, that of moving the head to one side and the other as if in negation; but this it could not be, for this significance of the gesture was wholly unknown to

him at that time. Rather had the child received the impression from my voice that he was to do something that he was bidden, and he did what was easy to him just at the moment, "mechanically," without knowing which of the movements that he had learned was required (cf. p. 116).

In regard to the *understanding of words heard*, several points of progress are to be noted; above all a change of place in consequence of the question, "Where is your clothes-press?" The child, standing erect, being held by the hand, at these words turns his head and his gaze toward the clothes-press, draws the person holding him through the large room by the hand, although he can not walk a step alone, and then opens the press without assistance. Here, at the beginning of the fourteenth month, is the *idea of a definite stationary object associated with a sound heard*, and so strongly that it is able to produce an independent act of locomotion, the first one; for, although before this the clothes-press had often been named and shown, the going to it is still the child's own performance.

It is now a matter of common occurrence that other words heard have also a definite relation to objects seen. The questions, "Where is papa? mamma? the light?" are invariably answered correctly, after brief deliberation, by turning the head (at the word "light," occasionally since the ninth month) and the gaze in the proper direction, and by lifting the right arm, often also the left, to point, the fingers of the outstretched hand being at the same time generally spread out. In the previous month, only the association of the word *mama* with the appearance of the mother was established.

The following are now added to the movements executed upon hearing certain words. The child likes to beat with his hands upon the table at which he is sitting. I said to him, "Play the piano," and made the movement after him. Afterward, when I merely said the word "piano" to the child (who was at the time quiet), without moving my hands, he *considered* for a few seconds, and then beat again with his hands on the table. Thus the recollection of the sound was sufficient to bring out the movement. Further, the child had accustomed himself, of his own accord, to give a regular *snort*, contracting the nostrils, pursing up the mouth, and breathing out through the nose. If now any one spoke to him of the "nose," this snorting was sure to be made. The word put the centro-motors into a state of excitement. The same is true of the command "Give!" since the child reaches out the object he is holding or is about to take hold of, in case any one puts out the hand or the lips to him. Some weeks ago this took place only with the ring and biscuit; now the word "give" has the same effect with any object capable of being grasped, but it operates almost like a reflex stimulus, "mechanically," without its being even once the case that the act of giving is a purely voluntary act or even occasioned by sympathy.

In these already learned co-ordinated movements made upon hearing the words "Please, How tall? rogue! no! piano! ring! give!" all of which are now executed with shorter intervals of deliberation as if by a well-trained animal, there is in general absolutely no deeper understanding present than that to this and the other sound-impression belong this and the other move-

ment. By means of daily repetition of both, the time required for the production of the movement after the excitement of the auditory nerve becomes less and less, the doubt as to which movement follows this or that sound withdrawing more and more. At last the responsive movements followed without any remarkable strain of attention. They became habitual.

Now and then, however, the movements are still confounded. Upon "no! no!" follows the touching of the head; upon "please," the shaking of the head; upon "rogue," the putting of the hands together, etc. These errors become frequent when a new impression diverts the attention. They become more and more rare through repetition of the right movements made for the child to see and through guiding the limbs of the child. A further evidence of the increased ability to learn toward the end of the month is the fact that the hands are raised in the attitude of begging not only at the command "Please," but also at the question, "How does the good child behave?" Thus, the experience is beginning to become a conscious one that, in order to obtain anything, the begging attitude is useful.

The fifteenth month brought no new definite independent utterances of sound with the exception of *wa*. Sensations and emotions, however, are indicated more and more definitely and variously by sounds that are inarticulate and sometimes unintelligible. Thus, astonishment is expressed by *hā-ā ĕā-ĕ;* joy by vigorous crowing in very high tones and more prolonged than before; further, very strong desire by repeated *häö, hä-ĕ;* pain, impatience, by screaming in vowels which pass over into one another.

The only word that is unquestionably used of the child's own motion to indicate a class of perceptions is still *atta*, *ha-atta*, which during the following month also is uttered softly, for the most part, on going out, and which signifies "away" or "gone" (weg), and still continues to be used also as it was in the eleventh month, when a light is dimmed (by a lamp-shade). Beyond this no syllable can be named that marked the dawn of mental independence, none that testified to the voluntary use of articulate sounds for the purpose of announcing perceptions. For the *brrr*, the frequent *dakkn*, *mamam*, *mömö*, and *papap*, are without significance in the monologues. Even the saying of *atta*, with turning of the head toward the person going away, has acquired the meaning of "away" (fort) only through being repeatedly said to the child upon his being carried out; but no one said the word when the lamp was extinguished. Here has been in existence for some time not only the formation of the concept, but also the designation of the concept by syllables. The similarity in the very different phenomena of going away and of the dimming of the light, viz., the disappearance of a visual impression, was not only discovered, but was named by the child entirely independently in the eleventh month, and has kept its name up to the present time. He has many impressions; he perceives, he unites qualities to make concepts. This he has been doing for a long time without words; but only in this *one* instance does the child express one of his concepts in language after a particular instance had been thus named for him, and then the word he uses is one not belonging to his later language, but one that belongs to all children the world over.

In regard to the repeating of syllables pronounced to him a marked advance is noticeable. The child can not, indeed, by any means repeat *na* and *pa* and *o* or *e* and *be*. He answers *a*, *taï*, *ta-a-o-ö-a*, and practices all sorts of tongue- and lip-exercises. But the other syllables uttered by him, especially *anna*, *taï*, *dakkn*, *a*, he says in response to any one who speaks them distinctly to him, and he gives them easily and correctly in parrot fashion. If a new word is said to him, e. g., "kalt" (cold), which he can not repeat, he becomes vexed, turns away his head, and screams, too, sometimes. I have been able to introduce into his vocabulary only one new word. In the sixty-third week he seized a biscuit that had been dipped in hot water, let it fall, drew down the corners of his mouth, and began to cry. Then I said "heiss" (hot), whereupon the child, speedily quieted, repeated *haï* and *haï-s* (with a just discernible *s*). Three days later the same experiment was made. After this the *haïs*, *haïsses*, with distinct *s*, was often heard without any occasion. Some days later I wanted him to say "hand." The child observed my mouth closely, took manifest pains, but produced only *ha-ïss*, then very distinctly *hass* with sharp *ss*, and *ha-ith*, *hadith*, with the English *th*; at another time distinctly *ha-its*. Thus, at a time when *ts* = *z* can not be repeated, there exists the possibility of pronouncing *z*. When I said to him "warm," *ass* was pronounced with an effort and distinctly, although the syllable *wa* belonged to the child's stock of words. This was evidently a recollection of the previous attempts to repeat "heiss" and "hand."

Corresponding to this inability to say words after

another's utterance of them is an articulation as yet very imperfect. Still, there is indication of progress in the distinctness of the *s*, the frequent English *th* with the thrusting out of the tip of the tongue between the incisors, the *w*, which now first appears often, as well as in the *smacking* first heard in the sixty-fifth week (in contented mood). The tongue is, when the child is awake, more than other muscles that in the adult are subject to cerebral volition, almost always in motion even when the child is silent. It is in various ways partly contracted, extended, bent. The lateral bending of the edges of the tongue downward and the turning back of the tip of the tongue (from left to right) so that the lower surface lies upward, are not easily imitated by adults. The mobility of my child's tongue is at any rate much greater than that of my tongue, notwithstanding the fact that, in consequence of varied practice from an early period in rapid speaking, the most difficult performances in rapid speaking are still easily executed by mine. The tongue is unquestionably the child's favorite plaything. One might almost speak of a lingual delirium in his case, as in that of the insane, when he pours forth all sorts of disconnected utterances, articulate and inarticulate, in confusion; and yet I often saw his tongue affected with fibrillar contractions as if the mastery of the hypoglossus were not as yet complete. Quite similar fibrillar movements seem to be made by the tongue in bulbar paralysis, and in the case of dogs and guinea-pigs whose hypoglossus has been severed.

To the number of words heard that already produce a definite movement are added the following new ones.

The child is asked, "Where is the moon? the clock? the eye? the nose?" and he raises an arm, spreads the fingers, and looks in the proper direction. If I speak of "coughing," he coughs; of "blowing," he blows; of "kicking," he stretches out his legs; of "light," he blows into the air, or, if there is a lamp in sight, toward that, looking at it meantime—a reminiscence of the blowing out of matches and candles often seen by him. It requires great pains to get from him the affirmative nod of the head at the spoken "ja, ja." Not till the sixty-fourth week was this achieved by means of frequent repetition and forcible direction, and the movement was but awkwardly executed even later—months after. On hearing the "no, no," the negative shake of the head now appeared almost invariably, and this was executed as by adults without the least uncertainty.

The holding out of his hand at hearing "Give the hand," occurs almost invariably, but is not to be regarded as a special case of understanding of the syllable "give," for the word "hand" alone produces the same result.

All these accomplishments, attained by regular training, do not afford the least evidence of an understanding of what is commanded when the sound-impression is converted into motor impulse. It is rather a matter of the establishment of the recollection of the customary association of both during the interval of deliberation. The words and muscular contractions that belong together are less often confounded, and the physiological part of the process takes less time, but its duration is noticeably prolonged when the child is not quite well. He deliberates for as much as twelve seconds when the

question is asked him, "Where is the rogue?" and then responds with the proper gesture (p. 115).

The sixteenth month brought few new articulate utterances of sound, none associated with a definite meaning; on the other hand, there was a marked progress in repeating what was said to the child, and especially in the understanding of words heard.

Among the sounds of his own making are heard—along with the *hä! hä-ö! ha-ĕ! hĕ-ĕ!* that even in the following months often expresses desire, but often also is quite without meaning—more seldom *hi*, *gö-gö*, *gö*, *f-pa* (the *f* for the first time), *a͡u*, and more frequently *ta*, *dokkn*, *tá-ha*, *a-bwa-bwa*, *bŭā-bŭ-ā*, and, as if by accident, once among all sorts of indefinable syllables, *dagon*. Further, the child—as was the case in the previous month—likes to take a newspaper or a book in his hands and hold the print before his face, babbling *ä-ĕ*, *ä-ĕ*, *ä-ĕ*, evidently in imitation of the reading aloud which he has often observed. By giving the command, "Read!" it was easy to get this performance repeated. Besides this, it is a delight to the child to utter a syllable—e. g., *bwa* or *ma*—over and over, some six times in succession, without stopping. As in the previous month, there are still the whispered *attö* and *hattö*, at the hiding of the face or of the light, at the shutting of a fan, or the emptying of a soup-plate, together with the *dakkn*, with the combinations of syllables made out of *ta*, *pa*, *ma*, *na*, *at*, *ap*, *am*, *an*, and with *mömö*. The *papa* and *mama* do not, however, express an exclusive relation to the parents. Only to the questions, "Where is papa?" "Where is mamma?" he points toward them, raising his hand with the fingers spread. Pain is an-

nounced by loud and prolonged screaming; joy by short, high-pitched, piercing crowing, in which the vowel *i* appears.

Of isolated vowels, *a* only was correctly repeated on command. Of syllables, besides those of the previous month, *mö* and *ma;* and here the child's excessive gayety over the success of the experiment is worthy of remark. He made the discovery that his parrot-like repetition was a fresh source of pleasure, yet he could not for several weeks repeat again the doubled syllables, but kept to the simple ones, or responded with all sorts of dissimilar ones, like *attob*, or said nothing. The syllable *ma* was very often given back as *hömá* and *hömò;* *pa* was never given back, but, as had been the case previously, only *ta* and *taï* were the responses, made with great effort and attention, and the visible purpose of repeating correctly. To the word "danke," pronounced for him with urgency innumerable times, the response is *dakkn*, given regularly and promptly, and this in the following months also. If all persuasion failed, and the child were then left to himself without any direction of his attention, then not infrequently new imitations of sounds would be given correctly—e. g., when I said "bo"—but these, again, would no longer succeed when called for. Indeed, such attempts often broke down utterly at once. Thus the child once heard a hen making a piteous outcry, without seeing the creature, and he tried in vain to imitate the sound, but once only, and not again. On the other hand, he often succeeds in repeating correctly movements of the tongue made for him to see, as the thrusting out of the tongue between the lips, by reason of the extraordinary mobility of his

tongue and lips; he even tries to smack in imitation. The more frequent partial contractions of the tongue, without attempts at speaking, are especially surprising. On one side, toward the middle of the tongue, rises a longitudinal swelling; then the edges are brought together, so that the tongue almost forms a closed tube; again, it is turned completely back in front. Such flexibility as this hardly belongs to the tongue of any adult. Besides, the lips are often protruded a good deal, even when this is not required in framing vocables.

The gain in the understanding of words heard is recognizable in this, that when the child hears the appropriate word, he takes hold, with thumb and forefinger, in a most graceful manner, of nose, mouth, beard, forehead, chin, eye, ear, or touches them with the thumb. But in doing this he often confounds ear and eye, chin and forehead, even nose and ear. "O" serves in place of "Ohr" (ear); "Au" in place of "Auge" (eye). In both cases the child soon discovered that these organs are in pairs, and he would seize with the right hand the lobe of my left and of my right ear alternately after I had asked "Ear?" How easily in such cases a new sound-impression causes confusion is shown by the following fact: After I had at one time pointed out one ear, and had said, "Other ear," I succeeded, by means of repetition, in getting him to point out this other one also correctly every time. Now, then, the thing was to apply what had been learned to the eye. When one eye had been pointed out, I asked, "Where is the other eye?" The child grasped at an ear, with the sight of which the sound "other" was now associated. Not till long after (in the twentieth month) did he learn to apply

this sound of himself to different parts of the body. On the other hand, he understands perfectly the significance of the commands, "Bring, fetch, give ——"; he brings, fetches, gives desired objects, in which case, indeed, the gesture and look of the speaker are decisive; for, if these are only distinctly apprehended, it does not make much difference which word is said, or whether nothing is said.

In the seventeenth month, although no disturbance of the development took place, there was no perceptible advance in the utterance of thoughts by sounds, or in the imitation of syllables pronounced by others, or in articulation, but there was a considerable increase of the acoustic power of discrimination in words heard and of the memory of sounds.

Of syllables original with the child, these are new: *Bibi*, *nä-nä-nä*—the first has come from the frequent hearing of "bitte"; the last is an utterance of joy at meeting and an expression of the desire to be lifted up. Otherwise, longing, abhorrence, pleasure and pain, hunger and satiety, are indicated by pitch, accent, *timbre*, intensity of the vocal sounds, more decidedly than by syllables. A peculiar complaining sound signifies that he does not understand; another one, that he does not wish. In place of *atta*, at the change of location of an object perceived, comes often a *t-tó* and *höt-tó*, with the lips much protruded. But, when the child himself wishes to leave the room, then he takes a hat, and says *atta*, casting a longing look at his nurse, or repeatedly taking hold of the door.

Of voluntary attempts to imitate sounds, the most noteworthy were the efforts to give the noise heard

on the winding of a time-piece, and to repeat tones sung.

The associations of words heard with seen, tangible objects on the one hand, and, on the other hand, with definite co-ordinated muscular movements, have become considerably more numerous. Thus the following are already correctly distinguished, being very rarely confounded: Uhr (clock), Ohr (ear); Schuh (shoe), Stuhl (chair), Schulter (shoulder), Fuss (foot); Stirn (forehead), Kinn (chin); Nase (nose), blasen (blow); Bart (beard), Haar (hair); heiss (hot), Fleisch (meat).

In addition to the above, eye, arm, hand, head, cheek, mouth, table, light, cupboard, flowers, are rightly pointed out.

The child so often obeys the orders he hears—"run," "kick," "lie down," "cough," "blow," "bring," "give," "come," "kiss"—that when he occasionally does not obey, the disobedience must be ascribed no longer, as before, to deficient understanding, but to caprice, or, as may be discerned beyond a doubt from the expression of his countenance, to a genuine roguishness. Thus the spoken consonants are at last surely recognized in their differences of sound.

In the eighteenth month this ability of the ear to discriminate, and with it the understanding of spoken words, increases. "Finger, glass, door, sofa, thermometer, stove, carpet, watering-pot, biscuit," are rightly pointed out, even when the objects, which were at first touched, or merely pointed at, along with loud and repeated utterance of those words, are no longer present, but objects like them are present. Say "Finger," and the child takes hold of his own fingers only; "Ofen"

(stove), then he invariably at first looks upward ("oben"). Besides the earlier commands, the following are correctly obeyed: "Find, pick up, take it, lay it down." Hand him a flower, saying, "Smell," and he often carries it to his nose without opening his mouth.

The repeating of syllables spoken for him is still rare; "mamma" is responded to by *ta*. The voluntary repeating of syllables heard by chance is likewise rare; in particular, "jaja" is now repeated with precision.

The *atta*, which used to be whispered when anything disappeared from the child's field of vision, has changed to *tto* and *t-tu* and *ftu*, with pouting of the lips.

In the monologues appear *näi*, *mimi*, *päpä*, *mimiä*, *pata*, *rrrrr*, the last uvular and labial for minutes at a time. But these meaningless utterances are simply signs of well-being in general, and are gladly repeated from pleasure in the exercise of the tongue and lips. The tongue still vibrates vigorously with fibrillar contractions when it is at rest, the mouth being open.

Characteristic for this period is the precision with which the various moods of feeling are expressed, without articulate sounds, by means of the voice, now become very high and strong, in screaming and crowing, then again in wailing, whimpering, weeping, grunting, squealing; so that the mood is recognized by the voice better than ever before, especially desire, grief, joy, hunger, willfulness, and fear. But this language can not be represented by written characters.

The same holds good of the nineteenth month, in which bawling and babbling are more rare, the spontaneous sound-imitations are more frequent, the vocal cords are strained harder, the mechanism of articulation

works with considerably more ease; the understanding and the retention of spoken words have perceptibly increased, but no word of the child's own, used always in the same sense, is added.

When the child has thrown an object from the table to the floor, he often follows it with his gaze and whispers, even when he does not know he is observed, *atta* or *t-ta*, which is here used in the same sense with *tuff* or *ft* or *ftu*, for "fort" (gone).

When he had taken a newspaper out of the paper-basket and had spread it on the floor, he laid himself flat upon it, holding his face close to the print, and said —evidently of his own accord, imitating, as he had done before, the reading aloud of the newspaper, which had often been witnessed by him—repeating it for a long time in a monotonous voice, *e-já-e-e-já nanana ána-ná-na atta-ána āje-já sā*; then he tore the paper into many small pieces, and next turned the leaves of books, uttering *pa-pa-ab ta hö-ö-ĕ mömömöm hö-önĕ.*

Such monologues are, however, exceptional at this period, the rule being uniform repetitions of the same syllable, e. g., *habb habb habb habb habbwa habbua.*

Screaming when water of 26° C. was poured over him in the bath appeared, a few days after the first experiment of this sort, even before the bathing, at sight of the tub, sponge, and water. Previously, fear had only in very rare cases occasioned screaming, now the *idea* of the cold and wet that were to be expected was enough to occasion violent screaming. After about three weeks of daily bathing with water from 18 to 24° C., however, the screaming decreased again. The experience that a pleasant feeling of warmth succeeded,

may have forced the recollection of the unpleasant feeling into the background. But the screaming can not at all be represented by letters; *ä* and *ö* do not suffice. The same is true of the screaming, often prolonged, before falling asleep in the evening, which occurs not seldom also without any assignable occasion, the child making known by it his desire to leave the bed. As this desire is not complied with, the child perceives the uselessness of the screaming, and at length obeys the command, "Lie down," without our employing force or expedients for soothing him.

How far the power of imitation and of articulation is developed, is shown especially by the fact that now, at last, *pa* is correctly pronounced in response; in the beginning *ta* was still frequently the utterance, then *ba*, finally *pa* almost invariably given correctly.

Further, these results were obtained:

Words said to him.	Response.
bitte . . .	*bis, bits, bit, bets, beest, be, bi, bit-th* (Eng., *th*).
hart . . .	*hatt, att, haat.*
Fleisch . .	*da-ich, daï-s-ch, daï-s-j.*
ma	*mö, ma.*

In *bits* appears with perfect distinctness (as already in the fifteenth month) the very rare *ts*=*z*. The "hart" was once only confounded with "haar," and responded to by grasping at the hair. The *bits* soon served to add force to the putting together of the hands in the attitude of begging; it is thus the first attempt at the employment of a German word to denote a state of his own, and that the state of desire. The other words

said to him, and illustrated by touching and putting the hands upon objects, could not be given by him in response. When he was to say "weich" (soft), "kalt" (cold), "nass" (wet), he turned his head away in repugnance, as formerly. To "nass" he uttered in reply, once only, *na*. Smacking, when made for him, was imitated perfectly. The early morning hours, in which the sensibility of the brain is at its highest, are the best adapted to such experiments; but these experiments were not multiplied, in order that the independent development might not be disturbed.

The progress in the discrimination of words heard, and in the firm retention of what has been repeatedly heard, is shown particularly in more prompt obedience, whether in abstaining or in acting.

To the list of objects correctly pointed out upon request are added "leg, nail, spoon, kettle," and others. It is noteworthy, too, that now, if the syllables *pa* and *ma*, or *papa* and *mamma*, are prefixed to the names of the known parts of the face and head, the child points these out correctly; e. g., to the question "Where is Mamma-ear," the child responds by taking hold of the ear of his mother, and to "papa-ear," of that of his father; so with "nose, eye," etc. But if asked for "mamma-beard," the child is visibly embarrassed, and finally, when there is a laugh at his hesitation, he laughs too.

The old tricks, "How tall is the child?" and "Where is the little rogue?" which have not been practiced for months past, have been retained in memory, for when in the eighty-second week I brought out both questions with urgency, the child be-

thought himself for several seconds, motionless, then suddenly, after the first question, raised both arms. After the other question he likewise considered for several seconds, and then pointed to his head as he used to do. His *memory* for sound-impressions often repeated and associated with specific movements is consequently good.

In the twentieth month there was an important advance to be recorded in his manner of repeating what was said to him. Suddenly, on the five hundred and eighty-fourth day, the child is repeating correctly and without difficulty words of two syllables that consist either of two like syllables—for the sake of brevity I will call these *like-syllabled*—or of syllables the second of which is the reverse of the first—such I call *reverse-syllabled*. Thus of the first class are *papa*, *mama*, *bebe*, *baba*, *neinei*, *jaja*, *bobo*, *bubu ;* of the second class, *otto*, *enne*, *anna ;* these are very frequently given back quickly and faultlessly at this period, after the repetition of the single syllables *pa*, *ma*, and others had gone on considerably more surely than before, and the child had more often tried of himself to imitate what he heard. These imitations already make sometimes the impression of not being voluntary. Thus the child once—in the eighty-third week—observed attentively a redstart in the garden for two full minutes, and then imitated five or six times, not badly, the piping of the bird, turning round toward me afterward. It was when he saw me that the child first seemed to be aware that he had made attempts at imitation at all. For his countenance was like that of one awaking from sleep, and he could not now be induced to imitate sounds. After five days

the spectacle was repeated. Again the piping of the bird was reproduced, and in the afternoon the child took a cow, roughly carved out of wood, of the size of the redstart, made it move back and forth on the table, upon its feet, and chirped now as he had done at sight of the bird; *imagination* was here manifestly much excited. The wooden animal was to represent the bird, often observed in the garden, and nesting in the veranda; and the chirping and piping were to represent its voice.

On the other hand, words of unlike syllables, like "Zwieback" (biscuit), "Butterbrod," are either not given back at all or only in unrecognizable fashion, in spite of their being pronounced impressively for him. "Trocken" (dry) yields sometimes *tokkĕ*, *tokko*, *otto*. Words of one syllable also offer generally great difficulties of articulation: thus "warm" and "weich" become *wāi*, "kalt" and "hart" become *hatt*. Although "bi" and "te" are often rightly given each by itself, the child can not combine the two, and turns away with repugnance when he is to reproduce "bi-te." The same thing frequently happens, still, even with "mamma" and "papa." But the child, when in lively spirits, very often pronounces of his own accord the syllables "bi" and "te" together, preferring, indeed, *bidth* (with English *th*) and *beet* to "bitte." In place of "adjö" (adieu) he gives back *adē* and *adjē*. Nor does he succeed in giving back three syllables; e. g., the child says *papa*, but not "papagei," and refuses altogether to repeat "gei" and "pagei." The same is true of "Gut," "Nacht," although he of himself holds out his hand for "Gute Nacht."

When others laugh at anything whatsoever, the child laughs regularly with them, a purely imitative movement.

It is surprising that the reproducing of what is said to him succeeds best directly after the cold bath in the morning, when the child has been screaming violently and has even been shivering, or when he is still screaming and is being rubbed dry, and, as if resigned to his fate, lies almost without comprehension. The will, it would seem, does not intrude here as a disturbing force, and echolalia manifests itself in its purity, as in the case of hypnotics. The little creature is subdued and powerless. But he speedily recovers himself, and then it is often quite hard to tell whether he *will* not or *can* not say the word that is pronounced to him.

The *understanding of single words*, especially of single questions and commands, is considerably more prompt than in the previous month. Without there being any sort of explanation for it, this extraordinary understanding is here, manifesting itself particularly when the child is requested to fetch and carry all sorts of things. He has observed and touched a great deal, has listened less, except when spoken to. All training in tricks and performances, an evil in the modern education of children hard to avoid, was, however, suppressed as far as possible, so that the only new things were "making a bow" and "kissing the hand." The child practices both of these toward the end of the month, without direction, at coming and going. Many new objects, such as window, bed, knife, plate, cigar, his own teeth and thumbs, are correctly pointed out, if only the corresponding word is distinctly pronounced. Yet "Ofen" and "oben" are still confounded.

To put into written form the syllables invented by

the child independently, and to get at a sure denotation of objects by them, is exceedingly difficult, particularly when the syllables are merely whispered as the objects are touched, which frequently occurs. At the sight of things rolled noisily, especially of things whirling in a circle, the child would utter *rodi*, *otto*, *rojo*, and like sounds, in general, very indistinctly. Only *one* new concept could with certainty be proved to be associated with a particular sound. With *dā* and *ndā*, frequently uttered on the sudden appearance of a new object in the field of vision, in a lively manner, loudly and with a peculiarly demonstrative accent—also with *tā* and *ntā* —the child associates, beyond a doubt, existence, coming, appearing, shooting forth, emerging, in contrast with the very often softly spoken, whispered *atta*, *f-tu*, *tuff*, which signifies "away" or "gone." If I cover my head and let the child uncover it, he laughs after taking off the handkerchief, and says loudly *da;* if I leave the room, he says *atta* or *hätta*, or *ft* or *t-ta*, generally softly; the last of these, or else *hata*, he says if he would like to be taken out himself. In the eighty-seventh week we went away on a journey, and on the railway-train the child, with an expression of terror or of anxious astonishment, again and again said *attah*, but without manifesting the desire for a change of place for himself, even by stretching out his arms.

Two words only—*papa* for father, and *bät* or *bit* for "bitte," are, besides, rightly applied of the child's own accord. The prolonged screaming, from wantonness, of *nānānānā*, *nom-nom*, *hāhā*, *lālā*, chiefly when running about, has no definite meaning. The child exercises himself a good deal in loud outcry, as if he wanted to

test the power of his voice. These exercises evidently give him great pleasure. Still the highest crowing tones are no longer quite so high and piercing as they were formerly. The vocal cords have become larger, and can no longer produce such high tones. The screaming sounds of discontent, which continue to be repeated sometimes till hoarseness appears, but rarely in the night, have, on the contrary, as is the case with the shrill sounds of pain, scarcely changed their character, *hä-e*, *hä-ä-ä-ĕ*, *ĕ*. They are strongest in the bath, during the pouring on of cold water.

The child, when left to himself, keeps up all the time his loud readings ("Lesestudien"). He "reads" in a monotonous way maps, letters, newspapers, drawings, spreading them out in the direction he likes, and lies down on them with his face close to them, or holding the sheet with his hands close to his face, and, as before, utters especially vowel-sounds.

In the twenty-first month imitative attempts of this kind became more frequent; but singularly enough the babbling—from the eighty-ninth week on—became different. Before this time vowels were predominant, now more *consonants* are produced. When something is said for the child to reproduce that presents insuperable difficulties of articulation, then he moves tongue and lips in a marvelous fashion, and often says *ptö-ptö*, *pt-pt*, and *verlapp*, also *dla-dla*, without meaning, no matter what was the form of the word pronounced to him. In such practice there often appears likewise a wilfulness, showing itself in inarticulate sounds and the shaking of the head, even when it is merely the repetition of easy like-syllabled words that is

desired. Hence, in the case of new words, it is more difficult than before, or is even impossible to determine whether the child *will* not or whether he *can* not reproduce them. Words of unlike syllables are not repeated at all, not even "bitte." In place of "danke" are heard *dang-gee* and *dank-kee;* the former favorite *dakkn* is almost never heard. In most of the attempts at sound imitation, the tendency to the doubling of syllables is worthy of notice. I say "bi," and the answer is *bibi;* then I say "te," and the answer is *te-te.* If I say "bi-te," the answer is likewise *bibi;* a single time only, in spite of daily trial, the answer was *bi-te,* as if by oversight.

This doubling of syllables, involuntary and surely contrary to the will of the child, stands in remarkable contrast with the indolence he commonly shows in reproducing anything said, even when the fault is not to be charged to teasing, stubbornness, or inability. The child then finds more gratification in other movements than those of the muscles of speech. The babbling only, abounding in consonants, yields him great pleasure, particularly when it is laughed at, although it remains wholly void of meaning as language. Yet *bibi,* like *bäbä,* for "bitte," is correctly used by the child of his own accord.

A new word, and one that gives notice of a considerable advance, is the term used by the child when hungry and thirsty, for "milk" or "food." He says, viz., with indescribable longing in his voice, *mimi,* more rarely than before *mämä* and *mömöm* (page 85). The first appellation was certainly taken from the often-heard "milk" by imitation, and applied to biscuit

and other kinds of food. If the child, when he has eaten enough, is asked, "Do you want milk?" he says without direction, *neinein;* he has thus grasped and turned to use already the signification of the sound. The same is, perhaps, true also of "ja." For previously, when I asked the child as he was eating, "Does it taste good?" he was silent, and I would say, "Say jaja," and this would be correctly repeated. But in the ninety-first week he, of his own accord, answers the question with *jaja*—"yes, yes." This, too, may rest simply on imitation, without a knowledge of the meaning of the *ja*, and without an understanding of the question; yet there is progress in the recollection of the connection of the sound "schmeckt's" with *jaja*, the intermediate links being passed over.

In other cases, too, the strength of the memory for sounds is plainly manifested. To all questions of an earlier period, "Where is the forehead, nose, mouth, chin, beard, hair, cheek, eye, ear, shoulder?" the child now at once pointed correctly in every instance, although he might not have answered them for anybody even once for two weeks. Only the question, "Where is the thumb?" made him hesitate. But when the thumb had been again shown to him (firmly pressed), he knew it, and from that time pointed it out invariably without delay. To the question, "Where is the eye?" he is accustomed to shut both eyes quickly at the same time and to open them again, and then to point to my eye; to the question, "Axel's eye?" he responds by pointing to his own; to the question, "The other eye?" by pointing to the one not touched.

In the understanding of what is spoken astonishing

progress has been made—e. g., if I say, "Go, take the hat and lay it on the chair!" the child executes the order without considering more than one or two seconds. He knows the meaning of a great number of words that no one has taught him—e. g., "whip, stick, match, pen." Objects of this sort are surely distinguished by the child, for, upon receiving orders, he gets, picks up, brings, lays down, gives these things each by itself.

This understanding of spoken words is the more surprising, as his repetition of them continues still to be of a very rudimentary character. With the exception of some interjections, especially *jāĕ* as a joyous sound and of crowing sounds, also screaming sounds, which, however, have become more rare, the child has but few expressions of his own with a recognizable meaning; *ndä*, *ndä*, *da* is demonstrative "da" ("there") at new impressions.

Att, *att*, *att*, is unintelligible, perhaps indicative of movement.

Attah means "we are off" (upon setting out) and "I want to go" ("ich will fort"); *tatass*, *tatass* is unintelligible, possibly a sound-imitation.

When traveling by rail the child tried several times to imitate the hissing of the steam of the locomotive.

In the twenty-second month again there are several observations to record, which show the progress in understanding, the strengthening of the memory, and the greater facility in articulation. The child executes the orders given him with surprising accuracy, although the words spoken have not previously been impressed on him separately. Here, indeed, it is essential to consider the looks and gestures of those who give the or-

ders; but the child also does what I request of him without looking at me. Instances of confusion among the words known to him are also perceptibly more rare. Once I asked him very distinctly, "Where's the moon?" (Mond), and for answer the child pointed to his mouth (Mund). But the error was not repeated.

The strength of the word-memory appears particularly in this, that all the objects learned are more quickly pointed out on request than they were previously, and the facility of articulation is perceived in the multiplying of consonants in the monologues and in the frequent spontaneous utterance of *pss*, *ps*, *ptsch* (once), and *pth* (Engl.). The child says, without any occasion, *pa-ptl-dä*, *pt*, and gives a loud greeting from a distance with *hāā-ö*, with *ada*, and *ana*.

It seemed to me remarkable that the boy began several times without the least incitement to *sing* tolerably well. When I expressed my approval of it, he sprang about, overjoyed. At one time he sang, holding his finger on his tongue, first *rollo*, *rollo*, innumerable times, then *mama*, *mama*, *mämä*, *mama*.

The progress in the sound-mechanism is most plainly discerned in the greater certainty in reproducing what is spoken. Thus, "pst" is correctly given, and of reverse-syllabled words, very accurately, "anna, otto, alla, appa, enne"; of unlike-syllabled words, "lina," but still, notwithstanding many trials, not yet "bitte." *For the first time three-syllabled words also, plainly pronounced to him, were correctly given back*, viz., *a-mama* and *a-pa-pa*, as the child names his grandparents. Hitherto the vowels *e*, *i*, *o*, *u*, could not be correctly given every time, but "a" could be so given as before.

When the reproduction of any new word that is too hard is requested—e. g., "gute Nacht"—the child at this period regularly answers *tapěta*, *pěta*, *pta*, and *ptö-ptö*, also *rateratetat*, expressing thereby not merely his inability, but also, sometimes roguishly, his disinclination to repeat.

Ja ja and *nein nein*, along with *da* and *bibi* (with or without folding of the hands, for "bitte"), and *mimi*, continue still to be the only words taken from the language of adults that are used by the child in the proper sense when he desires or refuses anything. Apart from these appear inarticulate sounds, uttered even with the mouth shut. The intense cry of pain, or that produced by cold or wet or by grief at the departure of the parents (this with the accompaniment of abundant tears and the drawing of the corners of the mouth far down), makes the strongest contrast with the crowing for joy, particularly that at meeting again.

The twenty-third month brought at length *the first spoken judgment*. The child was drinking milk, carrying the cup to his mouth with both hands. The milk was too warm for him, and he set the cup down quickly and said, loudly and decidedly, looking at me with eyes wide open and with earnestness, *heiss* (hot). This single word was to signify "The drink is too hot!" In the same week, at the end of the ninety-ninth, the child of his own accord went to the heated stove, took a position before it, looked attentively at it, and suddenly said with decision, *hot* (*heiss*)*!* Again, a whole proposition in a syllable. In the sixty-third week for the first time the child had reproduced the word "hot" pronounced to him. Eight and a half months were required for the step from

the imitative *hot* to the independent *hot* as expressive of his judgment. He progressed more rapidly with the word "Wasser," which was reproduced as *watja*, and was called out longingly by the thirsty child a few weeks afterward. He already distinguishes water and milk in his own fashion as *watja* and *mimi*. Yet *mimmi*, *mömö*, and *māmā* still signify food in general, and are called out often before meal-times by the impatient and hungry child. The primitive word *atta* is likewise frequently uttered incidentally when anything disappears from the child's field of vision or when he is himself carried away. The other sound-utterances of this period proceeding from the child's own impulse are interesting only as exercises of the apparatus of articulation. Thus, the child not seldom cries aloud *oi* or *eu* (*äu*); further, unusually loud, *ana*, and for himself in play, *ida*, *didl*, *dadl*, *dldo-dlda*, and in singing tone *opojö*, *apojopojum aui*, *heissa*. With special pleasure the child, when talking to himself, said *papa*, *mama*, *mämä*, *mimi*, *momo*, of his own accord, but not "mumu"; on the other hand, *e-mama-ma-memama*, *mi*, *ma*, *mö*, *ma*. His grandparents he now regularly designates by *e-papa* and *e-mama*. He knows very well who is meant when he is asked, "Where is grandmamma? Grandpapa?" And several days after leaving them, when asked the question, e. g., on the railway-train, he points out of the window with a troubled look. The understanding of words heard is, again, in general more easy. The child for the most part obeys at once when I say, "drink, eat, shut, open, pick it up, turn around, sit, run!" Only the order "come!" is not so promptly executed, not, however, on account of lack of understanding, but from

willfulness. That the word-memory is becoming firm is indicated particularly by the circumstance that now the separate parts of the face and body are pointed out, even after pretty long intervals, quickly and upon request, on his own person and that of others. When I asked about his beard, the child (after having already pointed to my beard), in visible embarrassment, pointed with his forefinger to the place on his face corresponding to that where he saw the beard on mine, and moved his thumb and forefinger several times as if he were holding a hair of the beard between them and pulling at it, as he had had opportunity to do with mine. Here, accordingly, memory and imagination came in as supplementary to satisfy the demand made by the acoustic image.

The greatest progress is to be recorded in this month in regard to the reproduction of syllables and words. A perfecting of the process is apparent in the fact that when anything is said for him to repeat, his head is not turned away in unwillingness so often as before, in case the new word said to him is too difficult, nor are all sorts of incoherent, complicated sounds (*paterateratte*) given forth directly upon the first failure of the attempt at imitation. Thus, the following words were at this period, without systematic exercises, incidentally picked up (give, as before, the German pronunciation to the letters):

Spoken to him.	Reproduced.	Spoken to him.	Reproduced.
Ohr,	*Oa(r).*	Wasser,	*Wass, Watja.*
Tisch,	*Tiss.*	Hand,	*Hann.*
Haus,	*Hausesess.*	Heiss,	*Haïss.*
Hemd,	*Hem.*	Auge,	*Autschge.*
Peitsche,	*Paitsch, Paitse.*	Butter,	*Buotö.*

Spoken to him.	Reproduced.
Eimer,	*Aïma.*
Bitte,	*Bete, Bite.*
Blatt,	*Batn.*
Tuch,	*Tuhs.*
Papier,	*Patn, Paï.*
Fort,	*Wott.*
Vater,	*Fa-ata.*
Grete,	*Deete.*
Karl,	*Kara.*

Spoken to him.	Reproduced.
Alle,	*Alla.*
Leier,	*Laijai.*
Mund,	*Munn.*
Finger,	*Finge.*
Pferd,	*Pfowed, Fowid.*
Gute Nacht,	*Nag-ch Na.*
Guten Tag,	*Tatách.*
Morgen,	*Moigjen.*
Axel,	*Akkes, Aje, Eja.*

The four words, *Paitsch* or *Paitse*, *Bite*, *Watja*, and *Haïss*, are uttered now and then by the child without being said to him, and their use has regard to the meaning contained in them. His whip and his pail he learned to name quickly and correctly. His own name, Axel, on the contrary, he designates by the favorite interjections *Aje*, *Eja*. On the whole, variety of articulation is on the increase as compared with the previous month, but the ability to put syllables together into words is still but little developed. Thus, e. g., the child reproduces quite correctly "je," and "ja," and "na." But if any one says to him "Jena" or "Jana," the answer runs regularly *nena* or *nana*, and only exceptionally, as if by chance, *jena*. Further, he repeats correctly the syllables "bi" and "te" when they are given to him, and then also *bi-te;* afterward, giving up the correct imitation, he says *beti*, but can not reproduce *ti-be* or *tebi*. "Bett, Karre, Kuk," are correctly repeated.

Finally, echolalia, not observed of late, appears again. If the child hears some one speak, he often repeats the last syllable of the sentence just finished, if the accent were on it—e. g., "What said the man?"

man; or "Who is there?" *there?* "Nun?" (now) *nou* (*nōō*). Once the name "Willy" was called. Immediately the child likewise called *ŭilē*, with the accent on the last syllable, and repeated the call during an hour several dozens of times; nay, even several days later he entertained himself with the stereotyped repetition. Had not his first echo-play produced great merriment, doubtless this monotonous repetition would not have been kept up. In regard to the preference of one or another word the behavior of those about the child is not merely influential, but is alone decisive. I observed here, as I had done earlier, that urgent exhortations to repeat a new word have generally a much worse result than is obtained by leaving the child to himself. The correct, or at any rate the best, repetitions were those made when the child was not spoken to. Even adults can imitate others in their manner of speaking, their dialect, even their voice, much better when not called upon to do it, but left entirely to their own inclination. The wish or command of others generates an embarrassment which disturbs the course of the motor processes. I resolved, consequently, to abandon in the following month all attempts to induce the child to reproduce sounds, but to observe so much the more closely what he might say of his own accord.

In the last month of the second year of his life this leaving of him to himself proved fruitful in results to this extent—that voluntary sound-imitations gained considerably in frequency and accuracy. Particularly, genuine echolalia manifested itself more at this period in the repeating of the last syllables of sentences heard, the meaning of which remained unintelligible to the

child; and of single words, the sense of which became gradually clear to him by means of accompanying gestures. Thus, the word "Herein!" (Come in!) was repeated as an empty sound, and then *arein*, *harrein*, *haarein*, were shouted strenuously toward the door, when the child wanted to be let in; *ab* (off) was uttered when a neck-ribbon was to be loosened. *Moigen* signified "Guten Morgen!" *na*, "Gute Nacht!" To the question, "Was thun wir morgen?" (What shall we do tomorrow?) comes the echo-answer *moigen*. In general, by far the greater part of the word-imitations are much distorted, to strangers often quite unintelligible. *Ima* and *Imam* mean "Emma," *dakkngaggngaggn* again means "danke," and *betti* still continues to signify "bitte." Only with the utmost pains, after the separate syllables have been frequently pronounced, appear *dangēē* and *bittēē*. An apple (Apfel) is regularly named *apfelēēlēē* (from Apfelgelée); a biscuit (Zwieback), *wita*, then *wijak;* butter, on the contrary, is often correctly named. Instead of "Jawohl," the child almost invariably says *wolja;* for "Licht" *list* and *lists;* for "Wasser," *watja* still as before; for "pfui" he repeats, when he has been awkward, *ūi*, and often adds a *pott* or *putt* in place of "caput." "Gut" is still pronounced *ūt* or *tut*, and "fort," *okk* or *ott*. All the defects illustrated by these examples are owing rather to the lack of flexibility in the apparatus of articulation—even stammering, *tit-t-t-t*, in attempting to repeat "Tisch," appears—than to imperfect ability to apprehend sounds. For the deficiency of articulation shows itself plainly when a new word is properly used, but pronounced sometimes correctly and sometimes incorrectly. Thus, the "tsch" hitherto

not often achieved (twentieth month), and the simple "sch" in *witschi* and *wesch*, both signifying "Zwetschen," are imperfect, although both sounds were long ago well understood as commands to be silent, and Zwetschen (plums) have been long known to the child. Further, the inability to reproduce anything is still expressed now and then by *rateraterateratera;* the failure to understand, rather by a peculiar dazed expression of countenance, with an inquiring look.

With regard to the independent application of all the words repeated, in part correctly, in part with distortions, a multiplicity of meanings is especially noteworthy in the separate expressions used by the child. The primitive word *atta*, used with uncommon frequency, has now among others the following significations: "I want to go; he is gone; she is not here; not yet here; no longer here; there is nothing in it; there is no one there; it is empty; it is nowhere; out there; go out." To the question "Where have you been?" the child answers, on coming home, *atta*, and when he has drunk all there was in the glass, he likewise says *atta*. The concept common to all the interpretations adduced, "gone," seems to be the most comprehensive of all that are at the child's disposal. If we choose to regard a word like this *atta* as having the force of a whole sentence, we may note many such primitive sentences in this month. Thus, *mann* means, on one occasion, "A man has come," then almost every masculine figure is named *mann; auff*, accompanied with the offering of a key, signifies the wish for the opening of a box, and is cried with animation after vain attempts to open a watch. The concepts "male being" and

"open" are thus not only clear, but are already named with the right words. The distinguishing of men from women appears for months past very strikingly in this, that the former only are greeted by reaching out the hand. The manifold meaning of a single word used as a sentence is shown particularly in the cry of *papa*, with gestures and looks corresponding to the different meanings of it. This one word, when called out to his father, means (1) "Come play with me"; (2) "Please lift me up"; (3) "Please give me that"; (4) "Help me get up on the chair"; (5) "I can't," etc.

The greatest progress, however, is indicated by the *combination of two words* into a sentence. The first sentence of this sort, spoken on the seven hundred and seventh day of his life at the sight of the house that was his home, was *haim, mimi*, i. e., "I would like to go home and drink milk." The second was *papa, mimi*, and others were similar. Contrasted with these first efforts at the framing of sentences, the earlier meaningless monologues play only a subordinate part; they become, as if they were the remains of the period of infancy, gradually rudimentary: thus, *pipapapaï, breit, baraï*. A more important fact for the recognition of progress in speaking is that the words are often *confounded*, e. g., *watja* and *buotö* (for *butter*). In gestures also and in all sorts of performances there are bad cases of confusion almost every day; e. g., the child tries to put on his shoes, holding them with the heel-end to his toes, and takes hold of the can out of which he pours the milk into his cup by the lip instead of the handle. He often affirms in place of denying. His joy is, however, regularly expressed by loud laughing and very

high tones; his grief by an extraordinarily deep depression of the angles of the mouth and by weeping. Quickly as this expression of countenance may pass over into a cheerful one—often on a sudden, in consequence of some new impression—no confusion of *these* two *mimetic* movements takes place.

In the first month of the third year of life the progress is extraordinary, and it is only in regard to the articulatory mechanism that no important new actions are to be recorded. The child does not pronounce a perfect "u," or only by chance. Generally the lips are not enough protruded, so that "u" becomes "ou"; "Uhr" and "Ohr" often sound almost the same. The "i" also is frequently mixed with other vowel-sounds, particularly with "e." Probably the corners of the mouth are not drawn back sufficiently. With these exceptions the vowels of the German language now offer hardly any difficulties. Of the consonants, the "sch" and "cht" are often imperfect or wanting. "Waschtisch" is regularly pronounced *waztiz*, and "Gute Nacht" *gna.*

The sound-imitations of every kind are more manifold, eager, and skillful than ever before. Once the child even made a serious attempt to reproduce ten words spoken in close succession, but did not succeed. The attempt proves all the same that the word-imitation is now far beyond the lower echo-speech; yet he likes to repeat the last words and syllables of sentences heard by him even in the following months. Here belongs his saying *so* when any object is brought to the place appointed for it. When the reproduction is defective, the child shows himself to be now much more amenable

to correction. He has become more teachable. At the beginning of the month he used to say, when he wanted to sit, *ette*, then *etse*, afterward *itse;* but he does not yet in the present month say "setzen" or "sitzen." Hitherto he could repeat correctly at the utmost two words said for him. Now he repeats three, and once even four, imperfectly: *papa, beene, delle*, means "Papa, Birne, Teller," and is uttered glibly; but "Papa, Birne, Teller, bitte," or "Papa, Butter, bitte," is not yet repeated correctly, but *pata, butte, betti*, and the like; only very seldom, in spite of almost daily trial, *papa, beene, delle, bittee.*

Evidence of the progress of the memory, the understanding, and the articulation, is furnished in the answers the child gave when I asked him, as I touched various objects, "What is that?" He replied:

Autse,	for	Auge (eye).	*Hai,*	for	Haar (hair).
Nana,	"	Nase (nose).	*Ulter,*	"	Schulter (shoulder).
Ba,	"	Backe (back).	*Aam,*	"	Arm (arm).
Baat,	"	Bart (beard).	*Ann,*	"	Hand (hand).
Oë, Oa,	"	Ohr (ear).	*Wiër,*	"	Finger (finger).
Opf,	"	Kopf (head).	*Daima,*	"	Daumen (thumb).
Tenn,	"	Kinn (chin).	*Anu,*	"	Handschuh (glove).
Täne,	"	Zähne (teeth).	*Baïn,*	"	Bein (leg).

But not one word has the child himself invented. When a new expression appears it may be surely traced to what has been heard, as *uppe, oppee, appee, appei*, to "Suppe." The name alone by which he calls on his nurse, *wolá*, seemed hard to explain. If any one says, "Call Mary," the child invariably calls *wolá.* It is probable, as he used to call it *wolja*, that the appellation has its origin in the often-heard "ja wohl."

The correct use of single words, picked up, one

might say, at random, increases in a surprising manner. Here belong *baden*, *reiputtse*, for "Reissuppe," *la-ock* for "Schlafrock," *boter* for "Butter," *Butterbrod*, *Uhr*, *Buch*, *Billerbooch* for "Bilderbuch." In what fashion such words now incorporated into the child's vocabulary are employed is shown by the following examples: *Tul* (for "Stuhl") means—(1) "I should like to be lifted up on the chair; (2) My chair is gone; (3) I want this chair brought to the table; (4) This chair doesn't stand right." If the chair or other familiar object is broken, then it is still styled *putt* (for "caput," gone to smash); and if the child has himself broken anything he scolds his own hand, and says *oi* or *oui*, in place of "pfui" (fie)! He wants to write to his grandmother, and asks for *Papier*, a *daitipf* (for "Bleistift," pencil), and says *raiwe* (for "schreiben," write).

That misunderstandings occur in such beginnings of speech seems a matter of course. All that I observed, however, were from the child's standpoint rational. Some one says, "Schlag das Buch auf" (Open the book, but meaning literally "Strike upon the book"), and the child strikes upon the book with his hands without opening it. He does the same when one says, "Schlag auf das Buch" (Strike upon the book). Or we say, "Will you come? one, two!" and the child, without being able to count, answers, "Three, four." He has merely had the sequence 1, 2, 3, 4, said over to him frequently. But, on the whole, his *understanding* of words heard, particularly of commands, has considerably advanced; and how far the reasoning faculty has developed is now easily seen in his independent designations for concepts. For example, since his delight at gifts of all

sorts on his birthday, he says *burtsa* (for Geburtstag, birthday) when he is delighted by anything whatever. Another instance of childish induction was the following: The child's hand being slightly hurt, he was told to blow on his hand and it would be better. He did blow on his hand. In the afternoon he hit his head against something, and he began at once to blow of his own accord, supposing that the blowing would have a soothing effect, even when it did not reach the injured part.

In the forming of sentences considerable progress is to be recorded. Yet only once has the child joined more than four words in a sentence, and rarely three. His sentences consisting of two words, which express a fact of the present or of the immediate past, are often, perhaps generally, quite unintelligible to strangers. Thus, *danna kuha* signifies "Aunt has given me cake"; *Kaffee naïn*, "There is no coffee here"; and *mama etsee* or *etse* is intelligible only by means of the accompanying gesture as the expression of the wish, "Mamma, sit by me." *Helle pumme* signifies the wish to help (*helfen*) in pumping, and is uttered at the sight of persons pumping water.

The following sentence consisting of five words is particularly characteristic of this period, because it exhibits the first attempt to relate a personal experience. The child dropped his milk-cup and related *mimi atta teppa papa oï*, which meant "Milch fort [auf den] Teppich, Papa [sagte] pfui." (Milk gone [on] carpet, Papa [said] "Fie!") The words adopted by the child have often a very different meaning from that which they have in the language of adults, being not entirely misunderstood but peculiarly interpreted by the imitator. Thus, pronouns, which are not for a long time yet

understood in their true sense, signify objects themselves or their qualities. *Dein bett* means "the large bed."

In the twenty-sixth month a large picture-book, with good colored pictures, was shown to the child by me every day. Then he himself would point out the separate objects represented, and those unknown to him were named to him, and then the words were repeated by him. Thus were obtained the following results:

Said to him.	His imitation.
Blasebalg (bellows),	*ba-a-bats, blasabalitz.*
Saugflasche (nursing-bottle),	*augflaze.*
Kanone (cannon),	*nanone.*
Koffer (trunk),	*towwer, toffer, pfoffa, poffa, toff-wa.*
Fuchs (fox),	*fuhts.*
Kaffeekanne (coffee-urn),	*taffeetanne, pfafee-tanne.*
Frosch (frog),	*frotz.*
Klingel (bell),	*linli* (learned as *ingeling* and *linlin*).
Besen (broom),	*bēsann, beedsen, beedsenn.*
Stiefel (boot),	*tiefel, stibbell, tihbell, tibl.*
Nest (nest),	*netz.*
Storch (stork),	*toich.*
Giesskanne (watering-pot),	*tietstanne, ihtstanne, ziesstanne.*
Fisch (fish),	*fiz.*
Zuckerhut (sugar-loaf),	*ukkahut.*
Vogel (bird),	*wodal.*
Kuchen (cake),	*tuche, tuchēn* (hitherto *kuha*).
Licht (light),	*lihts, lits.*
Schlitten (sled),	*lita, litta.*
Tisch (table),	*tiss.*
Nuss (nut),	*nuhuss, nuss.*
Kaffeetopf (coffee-pot),	*poffee-topf.*
Hund (dog),	*und.*
Brief (letter),	*dief.*
Elephant,	*elafant.*
Fledermaus (bat),	*lebamaunz, fleedermauz.*
Kamm (comb),	*damm, lamm, namm.*
Schwalbe (swallow),	*baubee.*
Staar (starling),	*tahr.*

Of his own accord the child pointed out with certainty in the picture-book—

häm, hä-em, hemm	for	Helm (helmet).
hörz	"	Hirsch (stag).
tawell	"	Tafel (table).
lompee, lampé	"	Lampe (lamp).
lotz	"	Schloss (castle).
benne	"	Birne (pear).
torb	"	Korb (basket).
onne-erm	"	Sonnenschirm (parasol).
flatse	"	Flasche (bottle).
wetsa	"	Zwetschen (plums).
clawelier	"	Clavier (piano).
littl, litzl, lützl	"	Schlüssel (key).
löwee	"	Löwe (lion).
ofa	"	Ofen (stove).
ūă	"	Uhr (watch).
tint, kint	"	Kind (child).
naninchä	"	Kaninchen (rabbit).
manne	"	Pfanne (pan).
tomml, tromml	"	Trommel (drum).
tuhl	"	Stuhl (chair).

With these words, the meaning of which the child knows well, though he does not yet pronounce them perfectly, are to be ranked many more which have not been taught him, but which he has himself appropriated Thus, *tola* for Kohlen (coals), *dals* for Salz (salt). Other words spontaneously appropriated are, however, already pronounced correctly and correctly used, as *Papier* (paper), *Holz* (wood), *Hut* (hat), *Wagen* (carriage), *Teppich* (carpet), *Deckel* (cover), *Milch*, *Teller* (often *tellĕ*), *Frau*, *Mann*, *Mäuse*. These cases form the minority, and are striking in the midst of the manifold mutilations which now constitute the child's speech. Of these mutilations some are, even to his nearest relatives who

are in company with the child every day, unintelligible or only with great pains to be unriddled. Thus, the child calls himself *Attall* instead of Axel; says also *rräus Atsl* for "heraus Axel," i. e., "Axel wants to go out." He still says *bita* for "bitte," and often *mima* or *mami* for Marie; *apf* for "Apfel." The numerous mutilations of the words the child undertakes to speak are not all to be traced to defect of articulation. The "sch" is already perfectly developed in *Handschuh;* and yet in other words, as appears from the above examples, it is either simply left out or has its place supplied by *z* and *ss.* Further, it sounds almost like wantonness when frequently the surd consonant is put in place of the sonant one or *vice versa;* when, e. g., *puch* (for Buch) *pücherr* is said on the one hand, and *wort* instead of "fort" on the other. Here belongs likewise the peculiar staccato manner of uttering the syllables, e. g., *pil-ter-puch* (Bilder-buch—picture-book). At other times is heard a hasty *billerbuch* or *piller-puch.*

The babbling monologues have become infrequent and more of a play with words and the syllables of them, e. g., in the frequently repeated *papa-ŭ-á-ŭa.*

On the other hand, independent thoughts expressed by words are more and more multiplied. Here is an example: The child had been extraordinarily pleased by the Christmas-tree. The candles on it had been lighted for three evenings. On the third evening, when only one of its many lights was burning, the child could not leave it, but kept taking a position before it and saying with earnest tone, *gunná-itz-boum,* i. e., "Gute nacht, Christbaum!" The most of his sentences

still consist of two words, one of which is often a verb in the infinitive. Thus, *helle mama*, *helle mami*, i. e., "helfen (help) Mama, Marie!" and *bibak tommen*, i. e., "der Zwieback soll kommen" (let the biscuit come); or *tsee machen* (make *c*)—on the piano the keys *c*, *d*, *e*, had often been touched separately by the little fingers accidentally, and the applause when in response to the question, "Where is *c*?" the right key was touched, excited the wish for repetition; *roth*, *drün machen* (make red or green)—the child was instructed by me in the naming of colors; and *dekkn pilen*, i. e., "Verstecken spielen" (play hide and seek). In quite short narratives, too, the verbs appear in the infinitive only. Such accounts of every-day occurrences—important to the child, however, through their novelty—are in general falling into the background as compared with the expression of his wishes in words as in the last-mentioned cases. Both kinds of initiatory attempts at speaking testify more and more plainly to awakening intellect, for, in order to use a noun together with a verb in such a way as to correspond to a wish or to a fact experienced, there must be added to the imitation of words heard and to the memory of them something which adapts the sense of them to the outward experiences at the time and the peculiar circumstances, and associates them with one another. This something is the intellect. In proportion as it grows, the capacity for being taught tricks decreases and the child is already ashamed to answer by means of his former gestures the old questions, "Where is the little rogue?" "How tall?" etc.

But how far from the intellect of the older child is

that of the child now two years and two months old appears from this fact, that the latter has not the remotest notion of number. He repeats mechanically, many times over, the words said for him, *one, two, three, four, five ;* but when objects of the same sort are put before him in groups, he confounds all the numbers with one another in spite of countless attempts to bring the number 2 into firm connection with the sound two, etc. Nor does he as yet understand the meaning of the frequently repeated "danke" (thanks), for, when the child has poured out milk for himself, he puts down the pitcher and says *dankee.*

One more remark is to be made about the names of animals. These names are multiplying in this period, which is an important one in regard to the genesis of mind. Ask, "What is the animal called ?" and the answer runs, *mumu, kikeriki, bauwau, piep-piep,* and others. No trace of onomatopoetic attempts can be discovered here. The child has received the names pronounced to him by his nurse and has retained them ; just so *hotto* for "Pferd" (horse), like *lingeling* for "Klingel" (bell). None the less every healthy child has a strong inclination to onomatopeia. The cases already reported prove the fact satisfactorily. The echolalia that still appears now and then really belongs to this. Inasmuch as in general in every onomatopoetic attempt we have to do with a sound-imitation or the reproducing of the oscillations of the tympanum as nearly as possible by means of the vocal cords, all attempts of the speechless child to speak are ultimately of onomatopoetic character in the earliest period ; but from the present time on sound-imitation retires before

the reasoning activity, which is now shooting forth vigorously in the childish brain.

In the twenty-seventh month the activity of thought manifests itself already in various ways. The independent ideas, indeed, move in a narrowly limited sphere, but their increasing number testifies to the development of the intellect. Some examples may be given :

The child sees a tall tree felled, and he says as it lies upon the ground, *pick up!* Seeing a hole in a dressing-gown, he says, *näĕn* (sew)! In his play he sometimes says to himself, *dib acht* (take care)! To the question, "Did it taste good?" the child answers while still eating, *mekk noch* (schmeckt noch), "It *does* taste good," thus distinguishing the past in the question from the present. The development of observation and *comparison* is indicated by the circumstance that salt is also called *sand.* On the other hand, the feeling of gratitude is as yet quite undeveloped. The child, as in the previous month, says *dankee* to himself when, e. g., he has opened his wardrobe-door alone. The word is thus as yet unintelligible to him, or it is used in the sense of "so" or "succeeded." His frequent expressions of pity are striking. When dolls are cut out of paper, the child weeps violently in the most pitiful manner, for fear that in the cutting a head (*Topf*) may be taken off. This behavior calls to mind the cries of *arme wiebak* (armer Zwieback—poor biscuit)! when a biscuit is divided, and *arme holz* (poor wood)! when a stick of wood is thrown into the stove. Nobody has taught the child anything of that sort.

The independent observations which he expresses

correctly but very briefly in a form akin to the style of the telegraphic dispatch are now numerous, e. g.:

Tain milch: There is no milk here.

Lammee aus, lampee aus: The flame, the lamp, is gone out.

Dass la-okk: That is the dressing-gown (Schlafrock).

Diss nicht la-okk: This is not the dressing-gown.

His wishes the child expresses by means of *verbs* in the infinitive or of substantives alone. Thus, *papa auftehen* (papa, get up), *frü-tükken* (breakfast), *aus-taigen* (get out), *nicht blasen* (not blow—in building card-houses), *pieldose aufziehn* (wind up the music-box), and *biback* (I should like a biscuit). Into these sentences of one, two, and three words there come, however, single adverbs not before used and indefinite pronouns, like *ēēn* and *ĕ* in *tann ēēn nicht* or *tannĕ nicht*, for "kann *er* nicht" or "kann *es* nicht." *Butter drauf* (butter on it), *Mama auch tommen* (mamma come, too), *noch mehr* (more), *blos Wasser* (only water), *hier* (here), are the child's own imperatives. *Schon wieder* (again) he does indeed say of his own accord on fitting occasions; but here he is probably repeating mechanically what he has heard. In all, the forming of a word that had not been heard as such, or that had not come from what had been heard through mutilation, has been surely proved in only a single instance. The child, viz., expressed the wish (on his seven hundred and ninety-sixth day) to have an apple pared or cut up, by means of the word *messen*. He knows a knife (Messer) and names it rightly, and while he works at the apple with a fork or a spoon or anything he can get hold of, or

merely points at it with his hand, he says repeatedly *messen!* Only after instruction did he say *Messer neiden* (mit dem Messer schneiden—cut with the knife). Here for the first time a wholly new word is formed. The concept and the word "knife" ("Messer") and the concept, "work with the knife," were present, but the word "schneiden" (cut) for the last was wanting, as also was "schälen" (pare). Hence, both in one were named *messen* (for "messern," it may be). The two expressions that used to be heard many times daily, the name *wolà* for the nurse Mima (Mary) and *atta*, have now almost disappeared. *Atta wesen* for "draussen gewesen" (been out) is still used, it is true, but only seldom. In place of it come now *weg*, *fort*, *aus*, and *allall*, in the sense of "empty," "finished." The too comprehensive, too indefinite concept *atta* has broken up into more limited and more definite ones. It has become, as it were, differentiated, as in the embryo the separate tissues are differentiated out of the previously apparently homogeneous tissue.

In the period of rapid development now attained, the child daily surprises us afresh by his independent applications of words just heard, although many are not correctly applied, as *tochen haiss* (boiling hot), said not only of the milk, but also of the fire.

When words clearly comprehended are used in a different sense from that in which adults use them—*incorrectly* used, the latter would say—there is, however, no *illogical* employment of them on the part of the child. For it is always the fact, as in the last example, that the concept associated with the word is taken in a more extended sense. The very young child

infers a law from a few, even from two observations, which present some agreement only in one respect, and that perhaps a quite subordinate respect. He makes inductions without deliberation. He has heard milk called "boiling hot," he feels its warmth, and then feels the warmth of the stove, consequently the stove also is "boiling hot"; and so in other cases. This logical activity, the *inductive* process, now prevails. The once favorite monologues, pure, meaningless exercises of articulation, of voice and of hearing, are, on the contrary, falling off. The frequent repetition of the same syllable, also of the same sentence (*lampee aus*), still survives particularly in animated expressions of wish, *erst essen* (first eat), *viel milch* (much milk), *mag-e-nicht* (don't like it). Desire for food and for playthings makes the child loquacious, much more than dislike does, the latter being more easily manifested by means of going away, turning around, turning away. The child can even beg on behalf of his carved figures of animals and men. Pointing out a puppet, he says *tint aïn tikche apfl!* Für das kind *ein* Stückchen Apfel! (A bit of apple for the child.)

Notwithstanding these manifold signs of a use of words that is beginning to be independent, the sound and word imitation continues to exist in enlarged measure. Echolalia has never, perhaps, been more marked, the final words of sentences heard being repeated with the regularity of a machine. If I say, "Leg die Feder hin" (Lay the pen down)! there sounds in response a *feder hin.* All sorts of tones and noises are imitated with varying success; even the whistle of the locomotive, an object in which a passionate interest is displayed; the

voices of animals; so also German, French, Italian, and English words. The French nasal "n" (in *bon*, *orange*), however—even in the following months—as well as the English "th," in *there* (in spite of the existence of the right formation in the fifteenth month), is not attained. The child still laughs regularly when others laugh, and on his part excites merriment through exact reproduction of separate fragments of a dialogue that he does not understand, and that does not concern him; e. g., *da hastn* (da hast Du ihn) (there you have him), or *aha sistĕ* (siehst Du) (do you see)? or *um Gottes willen* (for God's sake), the accent in these cases being also imitated with precision. But in his independent use of words the accentuation varies in irregular fashion. Such an arbitrary variation is *bitté* and *bi-tĕ*. *Beti* no longer appears.

As a noteworthy deficiency at this period is to be mentioned the feeble memory for often-prescribed answers to certain questions. To the question of a stranger, "What is your name?" the child for the first time gave of his own accord the answer *Attsell* (Axel), on the eight hundred and tenth day of his life. On the other hand, improper answers that have been seriously censured remain fixed in his recollection. The impression is stronger here. The weakness of memory is still shown most plainly when we try to make intelligible to the child the numerals one to five. It is a failure. The sensuous impression that *one* ball makes is so different from that which two balls make, the given words *one* and *two* sound so differently, that we can not help wondering how one and two, and likewise three, four, five, are confounded with one another.

A *question* has not yet been uttered by the child. The frequent *ist das* signifies merely "das ist," or it is the echo of the oft-heard question, "Was ist das?" and is uttered without the tone of interrogation. The articles are not used at all yet; at any rate, if used, they are merely imitated without understanding.

The defects of articulation are now less striking, but only very slowly does the correct and distinct pronunciation take the place of the erroneous and indistinct. We still have regularly:

bücher-rank	for Bücherschrank (book-case).
frai takkee	" Fräulein Starke (Miss Starke).
ērĕ, tseer	" Schere (shears).
raibĕ, raiben	" Schreiben (u. Zeichnen) (write or draw).
nur	" Schnur (string).
neiderin	" Schneiderin (tailoress).
dsön (also *schön*)	" schön (pretty).
lafen	" schlafen (sleep).
pucken	" spucken (spit).
dsehen (also *sehen*)	" sehen (see).

The sounds "sch" and "ſch" in the "st" as well as in the "sp" ("schneiden, Spiel") are often omitted without any substitute (*naidă, taign, piel*); more seldom their place is supplied by "s," as in *swer*="schwer" for "müde." Yet *ks, ts* are often given with purity in *bex, bux, Axl.* The last word is often pronounced *Atsĕl* and *Atsli* (heard by him as "Axeli"), very rarely *Akkl*; in "Aufziehen" the "z" is almost always correctly reproduced. Further, we still have

locotiwe	for Locomotive.	*ann-nepf*	for anknöpfen.
nepf	" Knöpfe (buttons).	*nits*	" nichts (nothing).

"Milch" is now permanently named correctly; no longer *mimi, mich;* Wasser, *wassa*, no longer *watja.*

But "gefährlich" is called *fährlich;* "getrunken," *trunken.*

The twenty-eighth month is characterized by a rapid increase of activity in the formation of ideas, on the one hand, and by considerably greater certainty in the use of words, on the other. Ambition is developed and makes itself known by a frequent *laänee* (*allein*, alone). The child wants to undertake all sorts of things without help. He asks for various objects interesting to him, with the words *Ding haben* (have the thing). That the faculty of observation and of combination is becoming perfected, is indicated by the following: The child sees an ox at the slaughter-house and says *mumu* (moo-moo); I add "todt" (dead); thereupon comes the response *mumu todt*, and after a pause the child says, of his own accord, *lachtett* (*geschlachtet*, slaughtered); then *Blut heraus* (blood out). The beginning of self-control is perceived in this, that the child often recollects, of himself, the strict commands he has received to refrain from this and that. Thus, he had been accustomed to strike members of the family in fun, and this had been forbidden him. Now, when the inclination seizes him still to strike, he says emphatically *nicht lagen* (*schlagen*, —not strike), *Axel brav* (good). In general the child names himself only by his name, which he also tells to strangers without being asked. His parents, and these alone, are mostly named *Papa* and *Mama*, but often also by their names.

The following is a proof of independent thinking while the understanding of language is still imperfect: At breakfast I say, "Axel is breakfasting with papa, is he not (*nicht wahr*)?" He replies

earnestly, with genuine child-logic, *doch wahr* (but he *is*)!

The earlier appellation *swer* and *wer* (schwer—heavy) for müde (tired) is preserved. This transference, like the other one, *locotiwe wassa trinkt*, when the engine is supplied with water, is the intellectual peculium of the child. The number of such childish conceptions has now become very large. On the other hand, the words independently formed out of what has been heard are not numerous:

beisst for gebissen (bitten),	*wesen* for gewesen (been),
reit " geritten (ridden),	*austrinkt* " ausgetrunken (drunk up),
esst " gegessen (eaten),	*tschulter* " Schulter (shoulder),

must be considered as mutilations, not as new formations. The great number of words correctly pronounced and used continues, on the other hand, to increase. There are even decided attempts to use single *prepositions: Nepfe* (Knöpfe) *für Mama* (buttons for mamma) may be simple repetition, like *Axel mit Papa;* but as utterances of this kind were not formerly repeated by him, though just as often made in his hearing, the understanding of the "für" and "mit" must now be awakened. From this time forth the understanding of several prepositions and the correct use of them abide. In addition there come into this period the first applications of the *article.* However often this part of speech may have been reproduced from the speech of others, it has never been said with understanding; but now in the expressions *um'n Hals* and *für'm Axel* (around the neck and for (the) Axel) there lies the beginning of right use of the article, and, in-

deed, also in the months immediately succeeding, almost solely of the definite article.

But more significant psychogenetically than all progress of this kind in the manipulation of language is the questioning that becomes active in this month. Although I paid special attention to this point from the beginning, I first heard the child ask a question of his own accord on the eight hundred and forty-fifth day of his life. He asked, "Where is Mima?" From that time on questions were more frequent; but in the time immediately following this his question was always one relating to something in space. The word "Where?" continued for a long time to be his only interrogative. He has also for a long time understood the "Where?" when he heard it. If, e. g., I asked, "Where is the nose?" without giving any hint by look or otherwise, this question has for months past been correctly answered by a movement of the child's arm to his nose. It is true that my question, "What is that?" a much more frequent one, is likewise answered correctly, although the word "What?" has never been used by the child.

His cleverness in reproducing even foreign expressions is surprising. The words pronounced for him by Italians (during a pretty long sojourn on Lake Garda), e. g., *uno*, *due*, *tre*, are given back without the least German accent. "Quattro," to be sure, became *wattro*, but *ancora piccolo* was absolutely pure. The imitation of the marching of soldiers, with the frequent cry *batelón eins sŭai* (battalion, one, two), already gives him the greatest pleasure. The imagination that is active in it is to be discerned, however, rather in gestures than in

words. How lively the child's power of imagination is appears also in the fact that flat figures rudely cut out of newspaper, to represent glasses and cups, are carried to the mouth like real ones.

The *articulation* has again become a little more perfected, but in many respects it is still a good deal deficient; thus, in regard to the "sch," he says:

abneiden for abschneiden (cut off).
hirn " Stirn (forehead).
verbrochen " versprochen (promised).
lagn " schlagen (strike).
runtergeluckt " heruntergeschluckt (swallowed).
einteign " einsteigen (get in).
On the other hand, *aus-teign* (Aussteigen) (alight).

Other defects of articulation are shown by the following examples:

topf for klopfen (knock).
üffte " lüften (take the air).
leben " kleben (adhere).
viloa, viloja, " Viola.
dummi " Gummi (gum).

The *l mouillé* can not be at all successfully given at the beginning of this month (*batělōn* for "bataillon"), and the nasal sounds in "orange" and "salon" offer insuperable difficulties (up to the second half of the fourth year). At the end of this month, however, I heard a *ganzee bataljohn* (*j* like English *y*). "Orange" continued to be, after *oraanjee* had been given up, *orohsě*. The softening (mouilliren—$nj = \tilde{n}$) was inconvenient in this case.

Quite correctly named at this period were eye, nose, cheek, tongue, mouth, ear, beard, hair, arm, thumb, finger.

Meaningless chatter has become much more rare. On the other hand, the child is in the habit of making all sorts of remarks, especially in the morning early after waking, for a quarter of an hour at a time and longer without interruption, these remarks for the most part consisting of a noun and verb and relating to objects immediately about him. Monologues also are given in a singing voice, syllables without meaning, often a regular singing, the child meantime running many times around the table; besides, his strong voice is not seldom practiced in producing high tones without any outward occasion; and, finally, it is worthy of note that sometimes in sleep, evidently when the child has a vivid dream, a scream is uttered. Talking in his sleep first appeared in his fourth year.

The greatest advance in the twenty-ninth month consists in the employment of the personal pronoun in place of his own name: *bitte gib mir Brod* (please give me bread) was the first sentence in which it appeared. "Ich" (I) is not yet said, but if I ask "Who is 'me'?" then the child names himself with his own name, as he does in general. Through this employment, more and more frequent from this time forth, of the pronoun instead of the proper name, is gradually introduced the inflection of the verbs he has heard; but at this time the imperative has its place generally supplied by the infinitive: *Păpă sāgn* and *Ssooss sitzen.* Sentences composed by himself, or heard and then used by him, like *das meckt* (schmeckt) *sehr gut* (that tastes very good), are rare; yet the discrimination between regular and irregular verbs has already begun to be made. To be sure, the question "Where have you been?" is an-

swered with *paziren gegeht* (goed to walk), and *ausgezieht* is said for *ausgezogen* (drawed out), also *geseht* (seed) instead of *gesehen* (seen); but at the same time frequently *eingetigen* and *ausgetigen*, instead of *ein-* and *aus-geteigt.* An interesting, rare misformation was *grefessen* for "gefressen." The verbs most frequently used seem to be "haben" (have) and "kommen" (come), and the forms "hat" and "kommt" are indeed correctly used sometimes, e. g., *viel Rauch kommt heraus* (much smoke comes out), and *gleich kommt Kaffee* (the coffee is coming). While the infinitives "haben" and "kommen" are uttered several times a day, the infinitive "sein" (to be) is never heard; but of this auxiliary verb "ist" and "wesen" are used, the latter for "gewesen." In every instance where the child expresses a desire by means of a verb, he simply takes the infinitive; e. g., he hears, as he sits in the room, the noise of the railway-train at a distance, and he says, *Locotiwe sehen.*

Further, *numbering* begins to be active to a noteworthy degree. Although the numerals are already well known to the child, he still confounds them on all occasions, and in view of the absolute failure of the many attempts to teach the child the significance of the numbers 1, 2, 3, 4, 5, one might infer that he has not yet perceived the difference between, e. g., 3 matches and 4 matches; yet counting is already taking place, though in very unexpected fashion. The child began, viz., on the eight hundred and seventy-eighth day, suddenly, of his own accord entirely, to count with his nine-pins, putting them in a row, saying with each one, *eins* (one)! *eins! eins! eins!* afterward saying *eins! noch eins*

(one more)! *noch eins! noch eins!* The process of adding is thus performed without the naming of the sums.

The questioning that appeared in the previous month, the surest sign of independent thought in the child, is somewhat more plainly manifest; but "Where" alone serves as the interrogative word, and that in its proper sense: Where is hat? "Which, who, why, when" are not spoken by the child and doubtless not understood, for, although succession in time is in many cases clear to him ("first eat," "then," "now"), yet in many other cases he does not know how to express distinctions of time; just as in comparing many and few, large and small objects, the quantity is wrongly given. Thus he says correctly, when many counters are to be brought together, *Zuviel* (too many), but says *Zuviel* wrongly for *Zuwenig* (too little) when there is too little butter on his bread. In this case the *Zuviel* (too much) sounds almost like irony, which, of course, is out of the question at his age. "Too much" and "too little" are confounded in the same way as 5 and 2. Yet, in another respect the memory has made a considerable gain. Expressions long since forgotten by those about the child are suddenly without assignable occasion sometimes uttered again with perfect distinctness, and the child even applies fitly what he has observed. Thus, he brings matches when he sees that some one wants to light a candle. I say to him, "Pick up the bread-crumbs." Upon this the child comes forward, though very slowly, cries out suddenly, *Get broom*, recollecting that he has seen the carpet swept, goes and gets the broom, and sweeps the crumbs away.

His memory for the utterances of animals as they have been made for him is very good. If I ask, e. g., "What does the duck say?" the answer is *Kuak kuak.* He has gained also in certainty in naming the separate parts of a drawing, especially of a locomotive, so that one chief condition of speech, in the full sense of the word —memory—may be said to be well developed.

Articulation, on the contrary, makes slow progress. "Hirsch" is called *Hirss*, "Schwalbe" *Walbe*, "Flasche" *Flassee.* The following are generally correctly pronounced: *Treppe*, *Fenster*, *Krug*, *Kraut*, *Kuchen*, *Helm*, *Besen*, *Cigarre*, *Hut*, *Giesskanne*, *Dinte*, *Buch*, *Birne.* For "barometer, thermometer," he says *mometer*, for "Schrauben" *raubn*, for "frühstücken" (to breakfast) still often *fri-ticken.*

In the *thirtieth month* the independent activity of thought develops more and more. When the child is playing by himself, e. g., he often says to himself: *Eimerchen ausleeren* (make pail empty); *Hackemesser* (chopping-knife). Thus his small vocabulary serves him at any rate for making clear his own ideas. Already his thinking is often a low speaking, yet only in part. When language fails him, he first considers well. An example: The child finds it very difficult to turn crosswise or lengthwise one of the nine-pins which he wants to put into its box, and when I say, "Round the other way!" he turns it around in such a way that it comes to lie as it did at the beginning, wrongly. He also pushes the broad side of the cover against the small end of the box. The child evidently understands the expression "Round the other way"; but as the expression is ambiguous (the head of the nine-pin may go to

the left, to the right, up, down, back, forward), we can understand that the pin should be turned now one way and again another way, and even brought back to its original position. Then appears the child's own deliberation without words—without any speaking at all, low or loud—until after frequently repeated packing and unpacking hardly any hesitation is shown. Many utterances show how easily at this period objects that have only a slight resemblance to one another or only a few qualities in common are included in one concept. When a roasted apple is peeled, the child sees the peel and says (thinking of his boiled milk, which he saw several hours previous, but which is not now present), *Milch auch Haut* (milk skin too). Similar is the expression *Kirche läutet* (church rings) when the tower-clock strikes.

The child forms concepts which comprehend a few qualities in unity, and indeed without designating the concept always by a particular word, whereas the developed understanding more and more forms concepts with many qualities and designates them by words. Hence the concepts of the child have less content and more extent than those of adults. For this reason they are less distinct also, and are often ephemeral, since they break up into narrower, more distinct concepts; but they always testify to activity of thought.

A greater intellectual advance, however, is manifested at this time in the first intentional use of language in order to bring on a game of hide-and-seek. A key falls to the floor. The child picks it up quickly, holds it behind him, and to my question, "Where is the key?" answers *nicht mehr da* (no longer there). As

I found in the following months no falsehood, in the proper sense of the word, to record, but rather that the least error, the most trivial exaggeration, was corrected at once by the child himself, with peculiarly *naïve* seriousness, in a little story, with pauses between the separate words, so, too, in the present case the answer *nicht mehr da* is no falsehood, but is to be understood as meaning that the key is no longer to be seen. The expression of the face was roguish at the time.

The sole interrogative word continues still to be "Where?" e. g., *Where is ball?* The demonstratives *da* (there) and *dort* (yonder) (*dort ist nass*—wet) were more frequently spoken correctly in answer.

The "I" in place of his own name does not yet appear, because this word does not occur frequently enough in conversation with the child. The bad custom adults have of designating themselves in their talk with little children, not as in ordinary conversation by the word "I," but by the proper name, or as "aunt," "grandma," etc., postpones the time of saying "I" on the part of children. *Me* is pretty often used at this period, for the reason that it is frequently heard at mealtimes in "Give me!"

Bitte, liebe Mama, gib mir mehr Suppe (Please, dear mamma, give me more soup) is, to be sure, learned by heart; but such sentences are at the proper time and in the proper place modified and even independently applied. *Noch mehr, immer noch mehr, vielleicht, fast* (more, more yet, perhaps, almost), are also expressions often properly employed, the last two, however, with uncertainty still. *Fast gefallen* (almost fell) the child says when he has actually fallen down.

Although declension and conjugation are as yet absolutely lacking, a transition has become established from the worst form of dysgrammatism to the beginning of correct diction by means of the more frequent use of the plural in nouns (*Rad*, *Räder*), the more frequent employment of the article (*för dĕ Papa*), the not very rare strong inflection (*gegangen* instead of the earlier *gegeht*; *genommen* instead of the earlier *genehmt*). To be sure, the infinitive still stands in the place of the participle and the imperative in by far the great majority of cases. The auxiliaries are often omitted or employed in strange misformations, e. g., "Where have you been?" Answer, *paziren gewarent* [something like *they wented 'alk*] (wir waren spazieren, spazieren gewesen).

In *articulation* no perceptible progress is to be recorded. The objects known from the picture-book are indeed for the most part rightly named, but new ones often have their names very much distorted—e. g., "Violine" is persistently called *wiloïne*. The "sch" is occasionally given correctly, but *s-trümpfe*, *auf-s-tehen* is the rule. The answer that has been learned to the question, "How old are you?" "Seit November zwei Jahre," is given *wember wai jahr*. The way in which the child learns the correct pronunciation is in general twofold: 1. Through frequent hearing of the correct words, since no one speaks as he himself does; thus, e. g., *genommen* took the place of *genehmt* without instruction. 2. Through having the words frequently pronounced on purpose for him to imitate with the utmost attention. Thus, e. g., the child up to this time always said *Locotiwe* and *Locopotiwe*. I exhorted him

a few times earnestly to say "Locomotive." The result was *Loco-loco-loco-mo-tive*, and then *Locomotive*, with exact copying of the accent with which I spoke. Singing also is imitated.

His memory for words that denote objects is very good; but when expressions designating something not very apparent to the senses are to be learned, he easily fails. Thus, the left and the right foot or arm, the left and the right cheek or hand, are very often correctly named, but often falsely. The difference between left and right can not be exactly described, explained, or made imaginable to the child.

In the *thirty-first month* two new questions make their appearance: The child asks, *Welches Papier nehmen?* (What paper take?) after he has obtained permission to make marks with the pencil, i. e., to *raiben* (write and draw), and *Was kost die Trommel?* (What does the drum cost?)

Now the indefinite article appears oftener; it is distinctly audible in *Halt n biss-chen Wasser!* More surprising are individual new formations, which disappear, however, soon after their rise; thus, the comparative of "hoch." The child says with perfect distinctness *hocher bauen* (build higher) in playing with wooden blocks; he thus forms of himself the most natural comparative, like the participle *gegebt* for "gegeben." In place of "Uhrschlüssel" (watch-key) he says *Slüssl-Uhr* (key-watch), thus placing the principal thing first.

He makes use of the strange expression *heitgestern* in place of "heute" (to-day), and in place of "gestern" (yesterday). The two latter taken singly are confounded with each other for a long time yet.

Sentence-forming is still very imperfect: *is smoke* means "that is smoke" and "there is smoke"; and *kommt Locomotiwe* stands for "da kommt eine oder die Locomotive" (There comes a, or the, engine). At sight of the bath-tub, however, the child says six times in quick succession *Da kommt kalt Wasser rein, Marie* (Cold water is to go in here, Mary). He frequently makes remarks on matters of fact, e. g., *warm out there.* If he has broken a flower-pot, a bandbox, a glass, he says regularly, of his own accord, *Frederick glue again*, and he reports faithfully every little fault to his parents. But when a plaything or an object interesting to him vexes him, he says, peevishly, *stupid thing*, e. g., to the carpet, which he can not lift; and he does not linger long over one play. His occupation must be changed very often.

The imitations are now again becoming less frequent than in the past months, and expressions not understood are repeated rather for the amusement of the family than unconsciously; thus, *Ach Gott* (Oh God!) and *wirklich grossartig* (truly grand). Yet the child sometimes sings in his sleep, several seconds at a time, evidently dreaming.

The pronunciation of the "sch," even in the favorite succession of words, *Ganzes Batalljohn marss* (for "marsch") *eins, zwei*, is imperfect, and although no person of those about him pronounces the "st" in "Stall, stehen" otherwise than as "scht," the child keeps persistently to *S-tall, s-tehen.* The pronunciation "scht" began in the last six months of the fourth year of his life, and in the forty-sixth month it completely crowded out the "st," which seems the more remarkable as the

child was taken care of by a Mecklenburg woman from the beginning of the fourth year.

In the *thirty-second month* the "I" began to displace his own name. *Mir* (*gib mir*) and *mich* (*bitte heb mich herauf*, please lift me up) had already appeared in the twenty-ninth to the thirty-first month; *ich komme gleich*, *Geld möcht ich haben* (I am coming directly, I should like money), are new acquirements. If he is asked "Who is *I?*" the answer is, *der Axel.* But he still speaks in the third person frequently; e. g., the child says, speaking of himself, *da ist er wieder* (here he is again), *Axel auch haben* (Axel have, too), and *mag-ĕ nicht*, thus designating himself at this period in fourfold fashion, by *I*, *he*, *Axel*, and by the omission of all pronouns and names. Although *bitte setz mich auf den Stuhl* (Please put me on the chair) is learned from hearing it said for him, yet the correct application of the sentence, which he makes of himself daily from this time on, must be regarded as an important advance. The same is true of the forming of clauses, which is now beginning to take place, as in *Weiss nicht, wo es ist* (Don't know where it is). New also is the separation of the particle in compound verbs, as in *fällt immer um* (keeps tumbling over).

Longer and longer names and sentences are spoken with perfect distinctness, but the influence of the dialect of the neighborhood is occasionally perceptible. His nurse is the one who talks most with him. She is from the Schwarzwald, and from her comes the omission of the "n" at the end of words, as in *Kännche*, *trocke.* Besides, the confounding of the surd, "p," with the sonant, "b" (*putter*), is so frequent that it may well be

taken from the Thuringian dialect, like the confounding of "eu" and "ei" (*heit*). The only German sounds that still present great difficulties are "sch" and "chts" (in "nichts").

The memory of the child has indeed improved, but it has become somewhat fastidious. Only that which seems interesting and intelligible to the child impresses itself permanently; on the other hand, useless and unintelligible verses learned by rote, that persons have taught him, though seldom, for fun, are forgotten after a few days.

In the *thirty-third month* the strength of memory already mentioned for certain experiences shows itself in many characteristic remarks. Thus the child, again absent from home with his parents for some weeks, says almost every evening, *gleich blasen die Soldaten* (the soldiers, i. e., the band, will play directly), although no soldier is to be seen in the country far and wide. But at home the music was actually to be heard every evening.

At sight of a cock in his picture-book the child says, slowly, *Das ist der Hahn—kommt immer—das ganze Stück fortnehmt—von der Hand—und laüft fort* ("That is the cock—keeps coming—takes away the whole piece—out of the hand—and runs off"). This narrative—the longest yet given, by the way—has reference to the feeding of the fowls, on which occasion the cock had really carried off a piece of bread. The doings of animals in general excited the attention of the child greatly. He is capable even of forgetting to eat, in order to observe assiduously the movements of a fly. *Jetzt geht in die Zeitung—geht in die Milch!*

Fort Thier! Geh fort! Unter den Kaffee! (Now he is going into the newspaper—going into the milk! Away, creature! go away! into the coffee!) His interest is very keen for other moving objects also, particularly locomotives.

How little clearness there is in his conceptions of animal and machine, however, appears from the fact that both are addressed in the same way. When his father's brother comes, the child says, turning to his father, *neuer* (new) *Papa;* he has not, therefore, the slightest idea of that which the word "father" signifies. Naturally he can have none. Yet selfhood (Ichheit) has come forth at this period in considerably sharper manifestation. He cries, *Das Ding haben! das will ich, das will ich, das will ich, das Spiel möcht ich haben!* (Have the thing! I want it, I should like the game.) To be sure, when one says "komm, ich knöpfs dir zu" (come, I will button it for you), the child comes, and says, as an echo, *ich knöpfs dir zu* (I will button it for you), evidently meaning, "Button it for me"! He also confounds *zu viel* (too much) with *zu wenig* (too little), *nie* (never) with *immer* (always), *heute* (to-day) with *gestern* (yesterday); on the contrary, the words *und*, *sondern*, *noch*, *mehr*, *nur*, *bis*, *wo* (and, but, still, more, only, till, where) are always used correctly. The most striking mistakes are those of conjugation, which is still quite erroneous (e. g., *getrinkt* and *getrunkt* along with *getrunken*), and of articulation, the "sch" (*dsen* for "schön") being only seldom pure, mostly given as "s" or "ts." "Toast" is called *Toos* and *Dose.*

After the first thousand days of his life had passed, the observation of him was continued daily, but not the

record in writing. Some particulars belonging to the following months may be noted:

Many expressions accidentally heard by the child that excited the merriment of the family when once repeated by him, were rehearsed times without number in a laughing, roguish, obtrusive manner, thus, *du liebe Zeit.* The child also calls out the name of his nurse, *Marie*, often without meaning, over and over again, even in the night. He calls others also by this name in manifest distraction of mind, often making the correction himself when he perceives the mistake.

More and more seldom does the child speak of himself in the third person, and then he calls himself by his name, never saying "he" any more. Usually he speaks of himself as "I," especially "I will, I will have that, I can not." Gradually, too, he uses *Du* in address, e. g., *Was für hübsen Rock hast Du* (What a handsome coat you have)! Here the manner of using the "Was" is also new.

On the ten hundred and twenty-eighth day *warum* (why?) was first used in a question. I was watching with the closest attention for the first appearance of this word. The sentence ran, *Warum nach Hause gehen? ich will nicht nach Hause* (Why go home? I don't want to go home). When a wheel creaked on the carriage, the child asked, *Was macht nur so* (What makes that)? Both questions show that at last the instinct of causality, which manifested itself more than a year before in a kind of activity of inquiry, in experimenting, and even earlier (in the twelfth week) in giving attention to things, is expressed *in language;* but the questioning is often repeated in a senseless way till

it reaches the point of weariness. *Warum wird das Holz gesnitten?* (for "gesägt"—Why is the wood sawed?) *Warum macht der Frödrich die* [*Blumen*] *Töpfe rein?* (Why does Frederick clean the flower-pots?) are examples of childish questions, which when they receive an answer, and indeed whatever answer, are followed by fresh questions just as idle (from the standpoint of adults); but they testify plainly to a far-reaching independent activity of thought. So with the frequent question, *Wie macht man das nur?* (How is that done?)

It is to be said, further, that I found the endeavor impracticable to ascertain the order of succession in which the child uses the different interrogative words. It depends wholly on the company about him at what time first this or that turn of expression or question is repeated and then used independently. "Why" is heard by him, as a rule, less often than "What?" and "How?" and "Which?" Still, it seems remarkable that I did not once hear the child say "When?" until the close of the third year. The sense of space is, to be sure, but little developed at that time, but the sense of time still less. The use of the word "forgotten" (*ich habe vergessen*) and of "I shall" (do this or that) is exceedingly rare.

The articulation was speedily perfected; yet there was no success at all in the repetition of French nasal sounds. In spite of much pains "salon" remained *salo*, "orange" *orose;* and the French "je" also presented insuperable difficulties. Of German sounds, "sch" alone was seldom correct. It was still represented by *s;* for example, in *sloss* for "Schloss," *ssooss* for "Schooss."

His fondness for singing increases, and indeed all sorts of meaningless syllables are repeated with pleasure again and again, much as in the period of infancy, only more distinctly; but, just as at that time, they can not all be represented on paper or even be correctly reproduced by adults. For a considerable time he was fond of *ē-la*, *ē-la*, *la*, *la*, *la*, *la*, in higher and higher pitch, and with unequal intervals, *lálla-lálla*, *lilalula*. In this it was certainly more the joy over the increasing compass and power of his voice that stimulated him to repetition than it was the sound of the syllables; yet in the thirty-sixth month he showed great pleasure in his singing, of which peculiar, though not very pleasing, melodies were characteristic. The singing over of songs sung to him was but very imperfectly successful. On the other hand, the copying of the manner of speaking, of accent, cadence, and ring of the voices of adults was surprising, although echolalia proper almost ceased or appeared again only from time to time.

Grammatical errors are already becoming more rare. A stubborn fault in declension is the putting of *am* in place of *dem* and *der*, e. g., *das am Mama geben*. Long sentences are formed correctly, but slowly and with pauses, without errors, e. g., *die Blume—ist ganz durstig—möcht auch n bischen Wasser haben* (The flower is quite thirsty—would like a little water). If I ask now, "From whom have you learned that?" the answer comes regularly, *das hab ich alleine gelernt* (I learned it alone). In general the child wants to manage for himself without assistance, to pull, push, mount, climb, water flowers, crying out repeatedly and passionately, *ich möcht ganz alleine* (I want to [do it] all alone). In

spite of this independence and these ambitious inclinations, there seldom appears an invention of his own in language. Here belongs, e. g., the remark of the child, *das Bett ist zu holzhart* (the bed is too wooden-hard), after having hit himself against the bed-post. Further, to the question, "Do you like to sleep in the large room?" he answered, *O ja ganz lieberich gern;* and when I asked, "Who, pray, speaks so?" the answer came very slowly, with deliberation and with pauses, *nicht-nicht-nicht-nicht-nicht-niemand* (not—nobody).

How far advanced is the use of the participles, which are hard to master, is shown by the sentence, *die Milch ist schon heiss gemacht worden* (the milk has already been made hot).

The child's manner of speaking when he was three years old approximated more and more rapidly to that of the family through continued listening to them and imitation of them, so that I gave up recording it; besides, the abundant—some may think too abundant—material already presented supplies facts enough to support the foundations of the history of the development of speech in the child as I have attempted to set it forth. A systematic, thorough-going investigation requires the combined labor of many, who must all strive to answer the same questions—questions which in this chronological survey are, in regard to one single individual, in part answered, but in part could merely be proposed.

To observe the child every day during the first thousand days of his life, in order to trace the historical development of speech, was possible only through self-control, much patience, and great expenditure of time;

but such observations are necessary, from the physiological, the psychological, the linguistic, and the pedagogic point of view, and nothing can supply their place.

In order to secure for them the highest degree of trustworthiness, I have adhered strictly, without exception, to the following rules:

1. I have not adopted a single observation of the accuracy of which I was not *myself* most positively convinced. Least of all can one rely on the reports of nurses, attendants, and other persons not practiced in scientific observing. I have often, merely by a brief, quiet cross-examination, brought such persons to see for themselves the erroneous character of their statements, particularly in case these were made in order to prove how "knowing" the infants were. On the other hand, I owe to the mother of my child, who has by nature a talent for observation such as is given to few, a great many communications concerning his mental development which have been easily verified by myself.

2. Every observation must *immediately* be entered in writing in a diary that is always lying ready. If this is not done, details of the observations are often forgotten; a thing easily conceivable, because these details in themselves are in many ways uninteresting—especially the meaningless articulations—and they acquire value only in connection with others.

3. In conducting the observations every artificial strain upon the child is to be avoided, and the effort is to be made as often as possible to observe without the child's noticing the observer at all.

4. All training of the one-year-old and of the two-

year-old child must be, so far as possible, prevented. I have in this respect been so far successful that my child was not until late acquainted with such tricks as children are taught, and was not vexed with the learning by heart of songs, etc., which he was not capable of understanding. Still, as the record shows, not all unnecessary training could be avoided. The earlier a little child is constrained to perform ceremonious and other conventional actions, the meaning of which is unknown to him, so much the earlier does he lose the poetic naturalness which, at any rate, is but brief and never comes again; and so much the more difficult becomes the observation of his unadulterated mental development.

5. Every interruption of one's observation for more than a day demands the substitution of another observer, and, after taking up the work again, a verification of what has been perceived and noted down in the interval.

6. Three times, at least, every day the same child is to be observed, and everything incidentally noticed is to be put upon paper, no less than that which is methodically ascertained with reference to definite questions.

In accordance with these directions, tested by myself, all my own observations in this book, and particularly those of this chapter, were conducted. Comparison with the statements of others can alone give them a general importance.

What has been furnished by earlier observers in regard to children's learning to speak is, however, not extensive. I have collected some data in an appendix.

CHAPTER XIX.

DEVELOPMENT OF THE FEELING OF SELF, THE "I"-FEELING.

Before the child is in a condition to recognize as belonging to him the parts of his body that he can feel and see, he must have had a great number of experiences, which are for the most part associated with *painful feelings*. How little is gained for the development of the notion of the "I" by means of the first movements of the hands, which the infant early carries to the mouth, and which must give him, when he sucks them, a different feeling from that given by sucking the finger of another person, or other suitable objects, appears from the fact that, e. g., my child for months tugged at his fingers as if he wanted to pull them off, and struck his own head with his hand by way of experiment. At the close of the first year he had a fancy for striking hard substances against his teeth, and made a regular play of gnashing the teeth. When on the four hundred and ninth day he stood up straight in bed, holding on to the railing of it with his hands, *he bit himself on his bare arm*, and that the upper arm, so that he immediately cried out with pain. The marks of the incisors were to be seen long afterward. The child did not a second time bite himself in the arm, but only bit his fingers, and inadvertently his tongue.

The same child, who likes to hold a biscuit to the mouth of any member of the family to whom he is favorably disposed, offered the biscuit in the same way, entirely of his own accord, to his own foot—sitting on

the floor, holding the biscuit in a waiting attitude to his toes—and this strange freak was repeated many times in the twenty-third month. The child amused himself with it.

Thus, at a time when the attention to what is around is already very far developed, one's own person may not be distinguished from the environment. Vierordt thinks that a discrimination between the general feelings [i. e., those caused by bodily states] and the sensations that pertain to the external world exists in the third month. From my observations I can not agree with him ; for, although the division may begin thus early, yet it does not become complete until much later. In the ninth month the feet are still eagerly felt of by the little hands, though not so eagerly as before, and the toes are carried to the mouth like a new plaything. Nay, even in the nineteenth month it is not yet clear how much belongs to one's own body. The child had lost a shoe. I said, "Give the shoe." He stooped, seized it, and gave it to me. Then, when I said to the child, as he was standing upright on the floor, "Give the foot," in the expectation that he would hold it out, stretch it toward me, he grasped at it with both hands, and labored hard to get it and hand it to me.

How little he understands, even after the first year of his life has passed, the difference between the parts of his own body and foreign objects is shown also in some strange experiments that the child conducted quite independently. He sits by me at the table and strikes very often and rapidly with his hands successive blows upon the table, at first gently, then hard ; then, with the right hand alone, hard ; next, suddenly strikes him-

self with the same hand on the mouth; then he holds his hand to his mouth for a while, strikes the table again with the right hand, and then on a sudden strikes his own head (above the ear). The whole performance gave exactly the impression of his having for the first time noticed that it is one thing to strike oneself, one's own hard head, and another thing to strike a foreign hard object (forty-first week). Even in the thirteenth month the child often raps his head with his hand to try the effect, and seems surprised at the hardness of the head. In the sixteenth month he used not unfrequently to set the left thumb against the left side of the head, and at the same time the right thumb against the right side of the head, above the ears, with the fingers spread, and to push at the same time, putting on a strange, wondering expression of face, with wide-open eyes. This movement is not imitated and not inherited, but invented. The child is doubtless making experiments by means of it upon the holding of the head, head-shaking, resistance of his own body, perhaps also upon the management of the head, as at every thump of the thumbs against the temporal bones a dull sound was heard. The objectivity of the fingers was found out not much before this time by involuntary, painful biting of them, for as late as the fifteenth month the child bit his finger so that he cried out with pain. Pain is the most efficient teacher in the learning of the difference between subjective and objective.

Another important factor is the *perception of a change produced by one's own activity* in all sorts of familiar objects that can be taken hold of in the neighborhood; and the most remarkable day, from a psycho-

genetic point of view, in any case an extremely significant day in the life of the infant, is the one in which he first experiences the *connection of a movement executed by himself with a sense-impression following upon it.* The noise that comes from the tearing and crumpling of paper is as yet unknown to the child. He discovers (in the fifth month) the fact that he himself in tearing paper into smaller and smaller pieces has again and again the new sound-sensation, and he repeats the experiment day by day and with a strain of exertion until this connection has lost the charm of novelty. At present there is not, indeed, as yet any clear insight into the nexus of cause; but the child has now had the experience that he can himself be the cause of a combined perception of sight and sound regularly, to the extent that when he tears paper there appears, on the one hand, the lessening in size; on the other hand, the noise. The patience with which this occupation—from the forty-fifth to the fifty-fifth week especially—is continued with pleasure is explained by the gratification at being a cause, at the perception that so striking a transformation as that of the newspaper into fragments has been effected by means of his own activity. Other occupations of this sort, which are taken up again and again with a persistency incomprehensible to an adult, are the shaking of a bunch of keys, the opening and closing of a box or purse (thirteenth month); the pulling out and emptying, and then the filling and pushing in, of a table-drawer; the heaping up and the strewing about of garden-mold or gravel; the turning of the leaves of a book (thirteenth to nineteenth month); digging and scraping in the sand; the carrying of footstools hither and thither;

the placing of shells, stones, or buttons in rows (twenty-first month); pouring water into and out of bottles, cups, watering-pots (thirty-first to thirty-third months); and, in the case of my boy, the throwing of stones into the water. A little girl in the eleventh month found her chief pleasure in "rummaging" with trifles in drawers and little boxes. Her sister "played" with all sorts of things, taking an interest in dolls and pictures in the tenth month (Frau von Strümpell). Here, too, the eagerness and seriousness with which such apparently aimless movements are performed is remarkable. The satisfaction they afford must be very great, and it probably has its basis in the feeling of his own power generated by the movements originated by the child himself (changes of place, of position, of form) and in the proud feeling of being a cause.

This is not mere playing, although it is so called; it is *experimenting*. The child that at first merely played like a cat, being amused with color, form, and movement, has become a *causative being*. Herewith the development of the "*I*"-*feeling* enters upon a new phase; but it is not yet perfected. Vanity and ambition come in for the further development of it. Above all, it is *attention* to the *parts of his own body* and the *articles of his dress*, the nearest of all objects to the child's eye, that helps along the separation in thought of the child's body from all other objects.

I therefore made special observation of the directing of his look toward his own body and toward the mirror. In regard to the first I took note, among other facts, of the following:

17th week.—In the seizing movements, as yet im-

perfect, the gaze is fixed partly on the object, partly on *his own hand*, especially if the hand has once seized successfully.

18th week.—The very attentive regarding of the fingers in seizing is surprising, and is to be observed daily.

23d week.—When the infant, who often throws his hands about at random in the air, accidentally gets hold of one hand with the other, he regards attentively both his hands, which are often by chance folded.

24th week.—In the same way the child fixes his gaze for several minutes alternately upon a glove held by himself in his hands and upon his own fingers that hold it.

32d week.—The child, lying on his back, *looks* very frequently *at* his *legs* stretched up vertically, especially at his *feet*, as if they were something foreign to him.

35th week.—In every situation in which he can do so, the child tries to grasp a foot with both hands and carry it to his mouth, often with success. This monkey-like movement seems to afford him special pleasure.

36th week.—His own hands and feet are no more so frequently observed by him without special occasion. Other new objects attract his gaze and are seized.

39th week.—The same as before. In the bath, however, the child sometimes looks at and feels of *his own skin* in various places, evidently taking pleasure in doing so. Sometimes he directs his gaze to his legs, which are bent and extended in a very lively manner in the most manifold variety of positions.

55th week.—The child looks for a long time attentively at a person eating, and follows with his gaze every

movement; grasps at the person's face, and then, after *striking himself on the head*, fixes his gaze on his own hands. He is fond of playing with the fingers of the persons in the family, and delights in the bendings and extensions, evidently comparing them with those of his own fingers.

62d week.—Playing with his own fingers (at which he looks with a protracted gaze) as if he would pull them off. Again, one hand is pressed down by the other flat upon the table until it hurts, as if the hand were a wholly foreign plaything, and it is still looked at wonderingly sometimes.

From this time forth the gazing at the parts of his own body was perceptibly lessened. The child *knew* them as to their form, and gradually learned to distinguish them from foreign objects as parts belonging to him; but in this he by no means arrives at the point of considering, "The hand is mine, the thing seized is not," or "The leg belongs to me," and the like; but because all the visible parts of the child's body, on account of very frequently repeated observation, no longer excite the optic center so strongly and therefore appear no longer interesting—because the experiences of touch combined with visual perceptions always recur in the same manner—the child has gradually become accustomed to them and *overlooks* them when making use of his hands and feet. He no longer represents them to himself separately, as he did before, whereas every new object felt, seen, or heard, is very interesting to him and is separately represented in idea. Thus arises the definite separation of object and subject in the child's intellect. In the beginning the child is new to him-

self, namely, to the representational apparatus that gets its development only after birth ; later, after he has become acquainted with himself, after he, namely, his body, has lost the charm of novelty for him, i. e., for the representational apparatus in his brain, a dim feeling of the "I" exists, and by means of further abstraction the concept of the "I" is formed.

The progress of the intellect in the act of *looking into the mirror* confirms this conclusion drawn from the above observations.

For the behavior of the child toward his image in the glass shows unmistakably the gradual growth of the consciousness of self out of a condition in which objective and subjective changes are not yet distinguished from each other.

Among the subjective changes is, without doubt, the smiling at the image in the tenth week, which was probably occasioned merely by the brightness (Sigismund). Another boy in the twenty-seventh week looked at himself in the glass with a smile (Sigismund).

Darwin recorded of one of his sons, that in the fifth month he repeatedly smiled at his father's image and his own in a mirror and took them for real objects; but he was surprised that his father's voice sounded from behind him (the child). "Like all infants, he much enjoyed thus looking at himself, and in less than two months perfectly understood that it was an image, for if I made quite silently any odd grimace, he would suddenly turn round to look at me. He was, however, puzzled at the age of seven months, when, being out of doors, he saw me on the inside of a large plate-glass window, and seemed in doubt whether or not it was an

image. Another of my infants, a little girl, was not nearly so acute, and seemed quite perplexed at the image of a person in a mirror approaching her from behind. The higher apes which I tried with a small looking-glass behaved differently. They placed their hands behind the glass, and in doing so showed their sense; but, far from taking pleasure in looking at themselves, they got angry and would look no more." The first-mentioned child, at the age of not quite nine months, associated his own name with his image in the looking-glass, and when called by name would turn toward the glass even when at some distance from it. He gave to "Ah!" which he used at first when recognizing any person or his own image in a mirror, an exclamatory sound such as adults employ when surprised. Thus Darwin reports.

My boy gave me occasion for the following observations:

In the eleventh week he does not see himself in the glass. If I knock on the glass, he turns his head in the direction of the sound. His image does not, however, make the slightest impression upon him.

In the fourteenth and fifteenth weeks he looks at his image with utter indifference. His gaze is directed to the eyes in the image without any expression of pleasure or displeasure.

In the sixteenth week the reflected image is still either ignored or looked at without interest.

Near the beginning of the seventeenth week (on the one hundred and thirteenth day) the child for the first time regards his image in the glass with unmistakable attention, and indeed with the same expression with

which he is accustomed to fix his gaze on a strange face seen for the first time. The impression appears to awaken neither displeasure nor pleasure; the perception seems now for the first time to be distinct. Three days later the child for the first time undoubtedly laughed at his image.

When, in the twenty-fourth week, I held the child again before the glass, he saw my image, became very attentive, and suddenly turned round toward me, manifestly convincing himself that I stood near him.

In the twenty-fifth week he for the first time stretched out his hand toward his own image. He therefore regarded it as capable of being seized.

In the twenty-sixth week the child is delighted at seeing me in the glass. He turns round toward me, and evidently *compares* the original with the image.

In the thirty-fifth week the child gayly and with interest grasps at his image in the glass, and is surprised when his hand comes against the smooth surface.

In the forty-first to the forty-fourth week, the same. The reflected image is regularly greeted with a laugh, and is then grasped at.

All these observations were made before a very large stationary mirror.

In the fifty-seventh week, however, I held a small hand-mirror close to the face of the child. He looked at his image and then passed his hand behind the glass and moved the hand hither and thither as if searching. Then he took the mirror himself and looked at it and felt of it on both sides. When after several minutes I held the mirror before him again, precisely the same

performance was repeated. It accords with what was observed by Darwin in the case of anthropoid apes mentioned above (p. 197).

In the fifty-eighth week I showed to the child his photograph, cabinet-size, in a frame under glass. He first turned the picture round as he had turned the hand-mirror. Although the photographic image was much smaller than the reflected one, it seemed to be equally esteemed. On the same day (four hundred and second) I held the hand-mirror before the boy again, pointing out to him his image in it; but he at once turned away obstinately (again like the intelligent animal).

Here the incomprehensible—in the literal sense—was disturbing. But very soon came the insight which is wanting to the quadrumana, for in the sixtieth week the child saw his mother in the mirror, and to the question, "Where is mamma?" he pointed to the image in the mirror and then turned round, laughing, to his mother. Now, as he had before this time behaved roguishly, there is no doubt that at this time, after fourteen months, original and image were distinguished with certainty as such, especially as his own photograph no longer excited wonder.

Nevertheless, the child, in the sixty-first week, is still trying to feel of his own image in the glass, and he licks the glass in which he sees it, and, in the sixty-sixth week, also strikes against it with his hand.

In the following week for the first time I saw the child make grimaces before the glass. He laughed as he did it. I stood behind him and called him by name. He turned around directly, although he saw me plainly

in the glass. He evidently knew that the voice did not come from the image.

In the sixty-ninth week signs of vanity are perceived. The child looks at himself in the glass with pleasure and often. If we put anything on his head and say, "Pretty," his expression changes. He is gratified in a strange and peculiar fashion; his eyebrows are raised, and the eyes are opened wide.

In the twenty-first month the child puts some lace or embroidered stuff about him, lets it hang down from his shoulders, looks round behind at the train, advancing, stopping, eagerly throwing it into fresh folds. Here there is a mixture of apish imitation with vanity.

As the child had, moreover, even in the seventeenth month, been fond of placing himself before the glass and making all sorts of faces, the experiments with the mirror were no longer continued.

They show the transition from the infant's condition previous to the development of the *ego*, when he can not yet see distinctly, to the condition of the developed *ego*, who consciously distinguishes himself from his image in the glass and from other persons and their images. Yet for a long time after this step there exists a certain lack of clearness in regard to names. In the twenty-first month the child laughs at his image in the glass and points to it when I ask, "Where is Axel?" and at my image when asked, "Where is papa?" But, being asked with emphasis, the child turns round to me with a look of doubt. I once brought a large mirror near the child's bed in the evening after he had gone to sleep, so that he might perceive himself directly upon waking. He saw his image immediately

after waking, seemed very much surprised at it, gazed fixedly at it, and when at last I asked, "Where is Axel?" he pointed not to himself but to the image (six hundred and twentieth day). In the thirty-first month it still afforded him great pleasure to gaze at his image in the glass. The child would laugh at it persistently and heartily.

Animals show great variety of behavior in this respect, as is well known. A pair of Turkish ducks, that I used to see every day for weeks, always kept themselves apart from other ducks. When the female died, the drake, to my surprise, betook himself by preference to a cellar-window that was covered on the inside and gave strong reflections, and he would stand with his head before this for hours every day. He saw his image there, and thought perhaps that it was his lost companion.

A kitten before which I held a small mirror must surely have taken the image for a second living cat, for she went behind the glass and around it when it was conveniently placed.

Many animals, on the contrary, are afraid of their reflected image, and run away from it.

In like manner little children are sometimes frightened by the discovery of their own shadows. My child exhibited signs of fear at his shadow the first time he saw it; but in his fourth year he was pleased with it, and to the question, "Where does the shadow come from?" he answered, to our surprise, "From the sun" (fortieth month).

More important for the development of the child's *ego* than are the observation of the shadow and of the

image in the glass is the learning of speech, for it is not until words are used that the higher concepts are first marked off from one another, and this is the case with the concept of the *ego*. Yet the wide-spread view, that the "I"-*feeling* first appears with the beginning of the use of the word "I," is wholly incorrect. Many headstrong children have a strongly marked "I"-feeling without calling themselves by anything but their names, because their relatives in speaking with them do not call themselves "I," but "papa, mamma, uncle, O mamma," etc., so that the opportunity early to hear and to appropriate the words "I" and "mine" is rare. Others hear these words often, to be sure, especially from children somewhat older, and use them, yet do not understand them, but add to them their own names. Thus, a girl of two and a half years, named Ilse, used to say, *Ilse mein Tuhl* (Ilse, my chair), instead of "mein Stuhl" (Bardeleben). My boy of two and three fourths years repeated the "I" he heard, meaning by it "you." In the twenty-ninth month *mir* (me) was indeed said by him, but not "ich" (I), (p. 171). Soon, however, he named himself no more, as he had done in the twenty-third and even in the twenty-eighth month (pp. 147–167), by his first name. In the thirty-third month especially came *das will ich! das möcht ich!* (I wish that, I should like that) (p. 183). The fourfold designation of his own person in the thirty-second month (p. 180)—by his name, by "I," by "he," and by the omission of all pronouns—was only a brief transition-stage, as was also the misunderstanding of the "dein" (your) which for a time (p. 156) meant "gross" (large).

These observations plainly show that the "I"-feel-

ing is not first awakened by the learning of words, for this feeling, according to the facts given above, is present much earlier; but by means of speech the *conceptual* distinction of the "I," the self, the mine, is first made exact; the development, not the origin, of the "I"-feeling is simply favored.

How obscure the "I"-concept is even after learning the use of the personal pronouns is shown by the utterance of the four-year-old daughter of Lindner, named Olga, *die hat mich nass gemacht* (she has made me wet), when she meant that she herself had done it; and *du sollst mir doch folgen, Olga* (but you must follow me, Olga), the latter expression, indeed, being merely said after some one else. In her is noteworthy, too, the confounding of the possessives "his" and "her," e. g., *dem Papa ihr Buch auf der Mama seinen Platz gelegt* (her book, papa's, laid in his place, mamma's) (Lindner); and yet in these forms of speech there is an advance in the differentiation of the concepts.

All children are known to be late in beginning to speak about themselves, of what they wish to become, or of that which they can do better than others can, and the like. The *ego* has become an experience of consciousness long before this.

All these progressive steps, which in the individual can be traced only with great pains, form, as it were, converging lines that culminate in the fully developed feeling of the personality as exclusive, as distinct from the outer world.

Thus much the purely physiological view can admit without hesitation; but a further unification or indivisibility or unbroken permanence of the child's *ego*, it can

not reconcile with the facts, perfectly well established by me, that are presented in this chapter.

For what is the significance of the fact, that "to the child his feet, hands, teeth, seem a plaything foreign to himself"? and that "the child bit his own arm as he was accustomed to bite objects with which he was not acquainted"? "Seem" to what part of the child? What is that which bites in the child as in the very young chick that seizes its own toe with its bill and bites it as if it were the toe of its neighbor or a grain of millet? Evidently the "subject" in the head is a different one from that in the trunk. The *ego* of the brain is other than the *ego* of the spinal marrow (the "spinal-marrow-soul" of Pflüger). The one speaks, sees, hears, tastes, smells, and feels; the other merely feels, and at the beginning, so long as brain and spinal marrow have only a loose organic connection and no functional connection at all with each other, the two *egos* are absolutely isolated from each other. Newly-born children with no brain, who lived for hours and days, as I myself saw in a case of rare interest, could suck, cry, move the limbs, and feel (for they stopped crying and took to sucking when something they could suck was put into their mouths when they were hungry). On the other hand, if a human being could be born with a brain but without a spinal marrow and could live, it would not be able to move its limbs. When a normal babe, therefore, plays with its feet or bites itself in the arm as it would bite a biscuit, we have in this a proof that the brain with its perceptive apparatus is independent of the spinal marrow. And the fact that acephalic new-born human beings and animal embryos deprived of brain,

as Soltmann and I found, move their limbs just as sound ones do, cry just as they do, suck and respond to reflexes, proves that the functions of the spinal marrow (inclusive of the optic thalami, the corpora quadrigemina and the cervical marrow) are independent of the cerebral hemispheres (together with the corpus striatum, according to Soltmann).

Now, however, the brainless living child that sucks, cries, moves arms and legs, and distinguishes pleasure from displeasure, has indisputably an individuality, an *ego*. We must, then, of necessity admit two *egos* in the child that has both cerebrum and spinal marrow, and that represents to himself his arm as good to taste of, as something to like. But, if two, why not several? At the beginning, when the centers of sight, hearing, smell, and taste, in the brain are still imperfectly developed, each of these perceives for itself, the perceptions in the different departments of sense having as yet no connection at all with one another. The case is like that of the spinal marrow, which at first does not communicate, or only very imperfectly communicates, to the brain that which it feels, e. g., the effect of the prick of a needle, for the newly born do not generally react upon that. Only by means of very frequent coincidences of unlike sense-impressions, in tasting-and-touching, seeing-and-feeling, seeing-and-hearing, seeing-and-smelling, tasting-and-smelling, hearing-and-touching, are the intercentral connecting fibers developed, and then first can the various representational centers, these "I"-makers, as it were, contribute, as in the case of the ordinary formation of concepts, to the formation of the corporate "I," which is quite abstract.

This abstract "I"-concept, that belongs only to the adult, thinking human being, comes into existence in exactly the same way that other concepts do, viz., by means of the individual ideas from which it results, as e. g., the forest exists only when the trees exist. The subordinate "I's," that preside over the separate sense-departments, are in the little child not yet blended together, because in him the organic connections are still lacking; which, being translated into the language of psychology, means that he lacks the necessary power of abstraction. The co-excitations of the sensory centers, that are as yet impressed with too few memory-images, can not yet take place on occasion of a single excitation, the cerebral connecting fibers being as yet too scanty.

These co-excitations of parts of the brain functionally different, on occasion of excitation of a part of the brain that has previously often been excited together with those, form the physiological foundation of the psychical phenomenon of the formation of concepts in general, and so of the formation of the "I"-concept. For the special ideas of all departments of sense have in all beings possessed of all the senses—or of four senses, or of three—the common quality of coming into existence only under conditions of time, space, and causality. This common property presupposes similar processes in every separate sense-center of the highest rank. Excitations of one of these centers easily effect similar co-excitations of centers that have often been excited together with them through objective impressions, and it is this similar co-excitement extending itself over the cerebral centers of all the nerves of sense that evokes the composite idea of the "I."

According to this view, therefore, the "I" can not exist as a unit, as undivided, as uninterrupted; it exists only when the separate departments of sense are active with their *egos*, out of which the "I" is abstracted; e. g., it disappears in dreamless sleep. In the waking condition it has continued existence only where the centro-sensory excitations are most strongly in force; i. e., where the attention is on the strain.

Still less, however, is the "I" an aggregate. For this presupposes the exchangeability of the component parts. The seeing *ego*, however, can just as little have its place made good by a substitute as can the hearing one, the tasting one, etc. The sum-total of the separate leaves, blossoms, stalks, roots, of the plant does not, by a great deal, constitute the plant. The parts must be joined together in a special manner. So, likewise, it is not enough to add together the characteristics common to the separate sense-representations in order to obtain from these the regulating and controlling "I." Rather there results from the increasing number and manifoldness of the sense-impressions a continually increasing growth of the gray substance of the child's cerebrum, a rapid increase of the inter-central connecting fibers, and through this a readier co-excitement—association, so called—which unites feeling with willing and thinking in the child.

This union is the "I," the sentient and emotive, the desiring and willing, the perceiving and thinking "I."

CHAPTER XX.

SUMMARY OF RESULTS.

Of all the facts that have been established by me through the observation of the child in the first years of his life, the *formation of concepts without language* is most opposed to the traditional doctrines, and it is just this on which I lay the greatest stress.

It has been demonstrated that the human being, at the very beginning of his life, not only distinguishes pleasure and discomfort, but may also have single, distinct sensations. He behaves on the first day differently, when the appropriate sense-impressions exist, from what he does when they are lacking. The first effect of these feelings, these few sensations, is the association of their traces, left behind in the central nervous system, with inborn movements. Those traces or central impressions develop gradually the personal *memory*. These movements are the point of departure for the primitive activity of the intellect, which separates the sensations both in time and in space. When the number of the memory-images, of distinct sensations, on the one hand, on the other, of the movements that have been associated with them—e. g., "sweet" and "sucking"—has become larger, then a firmer association of sensation-and-movement-memories, i. e., of excitations of sensory and motor ganglionic cells takes place, so that excitement of the one brings with it co-excitement of the other. Sucking awakens the recollection of the sweet taste; the sweet taste of itself causes sucking. This

succession is already a separation *in time* of two sensations (the sweet and the motor sensation in sucking). The separation in space requires the recollection of two sensations, each with one movement; the distinction between sucking at the left breast and sucking at the right is made after one trial. With this, the first act of the intellect is performed, the first perception made, i. e., a sensation first localized in time and space. The motor sensation of sucking has come, like the sweet taste, *after* a similar one, and it has come between two unlike relations in space that were distinguished. By means of multiplied perceptions (e. g., luminous fields not well defined, but yet defined) and multiplied movements with sensations of touch, the perception, after considerable time, acquires an object; i. e., the intellect, which already allowed nothing bright to appear without boundary-lines, and thus allowed nothing bright to appear except in space (whereas at the beginning brightness, as was the case even later with sound, had no limitation, no demarcation), begins to assign a cause for that which is perceived. Hereby perception is raised to *representation*. The often-felt, localized, sweet, warm, white wetness, which is associated with sucking, now forms an idea, and one of the earliest ideas. When, now, this idea has often arisen, the separate perceptions that have been necessary to its formation are united more and more firmly. Then, when one of these latter appears for itself, the memory-images of the others will also appear, through co-excitement of the ganglionic cells concerned; but this means simply that the *concept* is now in existence. For the concept has its origin in the union of attributes. Attributes are perceived, and

the memory-images of them, that is, accordingly, memory-images of separate perceptions, are so firmly associated that, where only one appears in the midst of entirely new impressions, the concept yet emerges, because all the other images appear along with it. Language is not required for this. Up to this point, those born deaf behave exactly like infants that have all the senses, and like some animals that form concepts.

These few first ideas, namely, the individual ideas, or sense-intuitions that are generated by the first perceptions, and the simple general ideas (of a lower order), or concepts, arising out of these—the concepts of the child as yet without language, of microcephali also, of deaf-mutes, and of the higher animals—have now this peculiarity, that they have all been formed exactly in this way by the parents and the grandparents and the representatives of the successive generations (such notions as those of "food," "breast"). These concepts are not innate; because no idea can be innate, for the reason that several peripheral impressions are necessary for the formation of even a single perception. They are, however, inherited. Just as the teeth and the beard are not usually innate in man, but come and grow like those of the parents and are already implanted, piece for piece, in the new-born child, and are thus hereditary, so the first ideas of the infant, his first concepts, which arise unconsciously, without volition and without the possibility of inhibition, in every individual in the same way, must be called hereditary. Different as are the teeth from the germs of teeth in the newly-born, so different are the man's concepts, clear, sharply defined by words, from the child's ill-defined, obscure

concepts, which arise quite independently of all language (of word, look, or gesture).

In this wise the old doctrine of "innate ideas" becomes clear. Ideas or thoughts are themselves either representations or combinations of representations. They thus presuppose perceptions, and can not accordingly be innate, but may some of them be inherited, those, viz., which at first, by virtue of the likeness between the brain of the child and that of the parent, and of the similarity between the external circumstances of the beginnings of life in child and parent, always arise in the same manner.

The principal thing is the innate aptitude to perceive things and to form ideas, i. e., the innate intellect. By aptitude (Anlage), however, can be understood nothing else at present than a manner of reacting, a sort of capability or excitability, impressed upon the central organs of the nervous system after repeated association of nervous excitations (through a great many generations in the same way).

The brain comes into the world provided with a great number of impressions upon it. Some of these are quite obscure, some few are distinct. Each ancestor has added his own to those previously existing. Among these impressions, finally, the useless ones must soon be obliterated by those that are useful. On the other hand, deep impressions will, like wounds, leave behind scars, which abide longer; and very frequently used paths of connection between different portions of the brain and spinal marrow and the organs of sense are easier to travel even at birth (instinctive and reflexive processes).

Now, of all the higher functions of the brain, the ordering one, which compares the simple, pure sensations, the original experiences, and first sets them in an order of succession, viz., arranges them in time, then puts them side by side and one above another, and, not till later, one behind another, viz., arranges them in space—this function is one of the oldest. This ordering of the sense-impressions is *an activity of the intellect that has nothing to do with speech*, and the *capacity* for it is, as Immanuel Kant discovered, present in man "as he now is" (Kant) *before* the activity of the senses begins; but without this activity it can not assert itself.

Now, I maintain, and in doing so I take my stand upon the facts published in this book, that just as little as the intellect of the child not yet able to speak has need of words or looks or gestures, or any symbol whatever, in order to arrange in time and space the sense-impressions, so little does that intellect require those means in order to form concepts and to perform logical operations; and in this fundamental fact I see the material for bridging over the only great gulf that separates the child from the brute animal.

That even physiologists deny that there is any passage from one to the other is shown by Vierordt in his "Physiology of Infancy" (1877).

The fundamental fact that a genuinely logical activity of the brain goes on without language of any sort, in the adult man who has the faculty of speech, was discovered by Helmholtz. The logical functions called by him "unconscious inferences" begin, as I think I have shown by many observations in the newly-born, imme-

diately with the activity of the senses. Perception in the third dimension of space is a particularly clear example of this sort of logical activity without words, because it is developed slowly.

In place of the expression "unconscious," which, because it has caused much mischief, still prevents the term "unconscious inferences" from being naturalized in the physiology of the senses and the theory of perception, it would be advisable, since "instinctive" and "intuitive" are still more easily misunderstood, to say "wordless." Wordless ideas, wordless concepts, wordless judgments, wordless inferences, may be inherited. To these belong such as our progenitors often experienced at the beginning of life, such as not only come into existence without the participation of any medium of language whatever, but also are never even willed (intended, deliberate, voluntary), and can not under any circumstances be set aside or altered, whether to be corrected or falsified. An inherited defect can not be put aside, and neither can the inherited intellect. When the outer angle at the right of the eye is pressed upon, a light appears in the closed eye at the left, not at the right; not at the place touched. This optical illusion, which was known even in Newton's day, this wordless inductive inference, is hereditary and incorrigible; and, on the other hand, the hereditary wordless *concept* of food can neither be prevented from arising nor be set aside nor be formed otherwise than it was formed by our ancestors.

Innate, to make it once more prominent, is the faculty (the capacity, the aptitude, the potential function) of forming concepts, and some of the first concepts are

hereditary. New (not hereditary) concepts arise only after new perceptions, i. e., after experiences that associate themselves with the primitive ones by means of new connecting paths in the brain, and they begin in fact before the learning of speech.

A chick just out of the shell possesses the capacity to lay eggs—the organs necessary—in fact the future eggs are inborn in the creature; but only after some time does it lay eggs, and these are in every respect similar to the first eggs of its mother. Indeed, the chicks that come from these eggs resemble those of the mother herself; thus the eggs have hereditary properties. New eggs originate only by crossing, by external influences of all sorts, influences, therefore, of experience.

So, too, the new-born child possesses the capacity of forming concepts. The organs necessary for that are inborn in him, but not till after some time does he form concepts, and these are in all nations and at all times quite similar to the first concepts formed by the child's mother. Indeed, the inferences that attach themselves to the first concepts will resemble those which were developed in the mother or will be identical with them; these concepts have, then, hereditary properties. New concepts originate only through experience. They originate in great numbers in every child that learns to speak.

If the fact that children utterly ignorant of speech, even those born deaf, already perform logical operations with perfect correctness, proves the intellect to be independent of language, yet searching observation of the child that is learning to speak shows that only by means of verbal language can the intellect give precision to its primitive indistinct concepts and thereby develop itself

further, connecting ideas appropriately with the circumstances in which the child lives.

It is a settled fact, however, that many ideas must already be formed in order to make possible the acquirement of speech. The existence of ideas is a necessary condition of learning to speak.

The greatest intellectual advance in this field consists in this, that the specific method of the human race is discovered by the speechless child—the method of expressing ideas aloud and articulately, i. e., by means of expirations of breath along with various positions of the larynx and the mouth and various movements of the tongue. No child *invents* this method, it is *transmitted;* but each individual child *discovers* that by means of sounds thus originating one can make known his ideas and thereby induce feelings of pleasure and do away with discomfort. Therefore he applies himself to this process of himself, without instruction, provided only that he grows up among speaking people; and even where hearing, which serves as a means of intercourse with them, is wanting from birth, a life rich in ideas and an intelligence of a high order may be developed, provided that written signs of sound supply the place of sounds heard. These signs, however, can be learned only by means of instruction. The way in which writing is learned is the same as the way in which the alalic child learns to speak. Both rest upon imitation.

I have shown that the first firm association of an idea with a syllable or with a word-like combination of syllables, takes place exclusively through imitation; but a union of this sort being once established, the child

then freely invents new combinations, although to a much more limited extent than is commonly assumed. No one brings with him into the world a genius of such quality that it would be capable of inventing articulate speech. It is difficult enough to comprehend that imitation suffices for the child to learn a language.

What organic conditions are required for the imitation of sounds and for learning to speak I have endeavored to ascertain by means of a systematic collection, resting on the best pathological investigations, of all the disturbances of speech thus far observed in adults; and the daily observation of a sound child, who was kept away from all training as far as possible, as well as the frequent observation of other children, has brought me to the following important result:

That every known form of disturbance of speech in adults finds its perfect counterpart in the child that is learning to speak.

The child can not *yet* speak correctly, because his impressive, central, and expressive organs of speech are not yet completely developed. The adult patient can *no longer* speak correctly, because those parts are no longer complete or capable of performing their functions. The parallelism is perfect even to individual cases, if children of various ages are carefully observed in regard to their acquirement of speech. As to facts of a more general nature, we arrive, then, at the three following:

1. The normal infant understands spoken language much earlier than he can himself produce through imitation the sounds, syllables, and words he hears.

2. The normal child, however, before he begins to speak or to imitate correctly the sounds of language, forms of his own accord all or nearly all the sounds that occur in his future speech and very many others besides, and delights in doing it.

3. The order of succession in which the sounds of speech are produced by the infant is different with different individuals, and consequently is not determined by the principle of the least effort. It is dependent upon several factors—brain, teeth, size of the tongue, acuteness of hearing, motility, and others. Only in the later, intentional, sound-formations and attempts at speaking does that principle come under consideration.

In the acquirement of every complicated muscular movement, dancing, e. g., the difficult combinations which make a greater strain on the activity of the will are in like manner acquired last.

Heredity plays no part in this, for every child can learn to master perfectly any language, provided he hears from birth only the one to be learned. The plasticity of the inborn organs of speech is thus in the earliest childhood very great.

To follow farther the influence that the use of speech as a means of understanding has upon the intellectual development of the child lies outside the problem dealt with in this book. Let me, in conclusion, simply give a brief estimate of the questioning-activity that makes its appearance very early after the first attempts at speech, and also add a few remarks on the development of the "*I*"*-feeling.*

The child's questioning as a means of his culture is

almost universally underrated. The interest in causality that unfolds itself more and more vigorously with the learning of speech, the asking why, which is often almost unendurable to parents and educators, is fully justified, and ought not, as unfortunately is too often the case, to be unheeded, purposely left unanswered, purposely answered falsely. I have from the beginning given to my boy, to the best of my knowledge invariably, an answer to his questions intelligible to him and not contrary to truth, and have noticed that in consequence at a later period, in the fifth and the sixth and especially in the seventh year, the questions prove to be more and more intelligent, because the previous answers are retained. If, on the contrary, we do not answer at all, or if we answer with jests and false tales, it is not to be wondered at that a child even of superior endowments puts foolish and absurd questions and thinks illogically—a thing that rarely occurs where questions are rightly answered and fitting instruction is given, to say nothing of rearing the child to superstition. The only legend in which I allow my boy to have firm faith is that of the stork that brings new babes, and what goes along with that.

With regard to the development of the "I"-feeling the following holds good:

This feeling does not awake on the day when the child uses for the first time the word "I" instead of his own name—the date of such use varies according as those about it name themselves and the child by the proper name and not by the pronoun for a longer or a shorter period; but the "I" is separated from the "not-I" after a long series of experiences, chiefly of a painful

sort, as these observations have made clear, through the *becoming accustomed to the parts of one's own body.* These, which at first are foreign objects, affect the child's organs of sense always in the same manner, and thereby become uninteresting after they have lost the charm of novelty. Now, his own body is that to which the attractive objective impressions (i. e., the world) are referred, and with the production by him of new impressions, with the changes wrought by him (in the experimenting which is called "playing"), with the experience of being-a-cause, is developed more and more in the child the feeling of self. With this he raises himself higher and higher above the dependent condition of the animal, so that at last the difference, not recognizable at all before birth and hardly recognizable at the beginning after birth, between animal and human being attains a magnitude dangerous for the latter, attains it, above all, by means of language.

But if it is necessary for the child to appropriate to himself as completely as possible this highest privilege of the human race and through this to overcome the animal nature of his first period; if his development requires the stripping off of the remains of the animal and the unfolding of the responsible "I"—then it will conduce to the highest satisfaction of the thinking man, at the summit of his experience of life, to go back in thought to his earliest childhood, for that period teaches him plainly that he himself has his origin in nature, is intimately related to all other living creatures. However far he gets in his development, he is ever groping vainly in the dark for a door into another world; but the very fact of his reflecting upon the possibility of such a

door shows how high the developed human being towers above all his fellow-beings.

The key to the understanding of the great enigma, how these extremes are connected, is furnished in the history of the development of the mind of the child.

APPENDIXES.

A.

COMPARATIVE OBSERVATIONS CONCERNING THE ACQUIREMENT OF SPEECH BY GERMAN AND FOREIGN CHILDREN.

Among the earlier as among the later statements concerning the acquirement of speech, there are several that have been put forth by writers on the subject without a sufficient basis of observed facts. Not only Buffon, but also Taine and his successors, have, from a few individual cases, deduced general propositions which are not of general application.

Good observations were first supplied in Germany by Berthold Sigismund in his pamphlet, "Kind und Welt" ("The Child and the World") (1856); but his observations were scanty.

He noted, as the first articulate sounds made by a child from Thüringen (Rudolstadt), *ma*, *ba*, *bu*, *appa*, *ange*, *anne*, *brrr*, *arrr:* these were made about the middle of the first three months.

Sigismund is of the opinion that this first lisping, or babbling, consists in the production of syllables with only two sounds, of which the consonant is most often the first; that the first consonants distinctly pronounced are labials; that the lips, brought into activity by sucking, are the first organs of articulation; but this conjecture lacks general confirmation.

In the second three months (in the case of one child in the twenty-third week, with other healthy children considerably earlier) were heard, for the first time, the loud and high *crowing*-sounds, uttered by the child spontaneously, jubilantly, with lively movements of the limbs that showed the waxing power of the muscles: the child seemed to take pleasure in making the sounds. The utterance of syllables, on the other hand, is at this period often discontinued for weeks at a time.

In the third quarter of the first year, the lisping or stammering was more frequent. New sounds were added: *bä*, *fbu*, *fu*; and the following were among those that were repeated without cessation, *bäbäbä*, *dädädä*; also *adad*, *eded*.

In the next three months the child manifested his satisfaction in any object by the independent sound *ei*, *ei*. The first imitations of sounds, proved to be such, were made after the age of eleven months. But it is more significant, for our comprehension of the process of learning to speak, that long before the boy tried to imitate words or gestures, viz., at the age of nine months, he distinguished accurately the words "father, mother, light, window, moon, lane"; for he looked, or pointed, at the object designated, as soon as one of these words was spoken.

And when, finally, imitation began, musical tones, e. g., F, C, were imitated sooner than the spoken sounds, although the former were an octave higher. And the *ei*, *ei*, was repeated in pretty nearly the same tone or accent in which it had been pronounced for the child. Sneezing was not imitated till after fourteen months. The first word imitated by the child of his own accord (after fourteen months) was the cry "Neuback" (fresh-bake), as it resounded from the street; it was given back by the child, unsoli-

cited, as *ei-a*. As late as the sixteenth month he replied to the word *papa*, just as he did to the word *Ida*, only with *atta;* yet he had in the mean time learned to understand "lantern, piano, stove, bird, nine-pin, pot"—in all, more than twenty words—and to indicate by a look the objects named; he had also learned to make the new imperfect sounds *pujéh*, *pujéh*, *tupe tupe téh*, *ämmäm*, *atta*, *ho*.

In the seventeenth month came in place of these sounds the babbled syllables *mäm*, *mam*, *mad-am*, *a-dam*, *das;* in the case of other children, syllables different from these. Children often say several syllables in quick succession, "then suddenly stop as if they were thinking of something new—actually strain, as if they must exert themselves to bring their organs to utterance, until at last a new sound issues, and then this is repeated like the clack of a mill." Along with this appears the frequent doubling of syllables, as in *papa*, *mama*.

The boy, at twenty months, told his father the following, with pretty long pauses and animated gestures: *atten—beene—titten—bach—eine—puff—anna*, i. e., "Wir waren im Garten, haben Beeren und Kirschen gegessen, und in den Bach Steine geworfen; dann kam Anna" (we were in the garden, ate berries and cherries, and threw stones into the brook; then Anna came).

The observations of Sigismund are remarkable for their objectivity, their clearness of exposition, and their accuracy, and they agree with mine, as may easily be seen, in many respects perfectly. Unfortunately, this excellent observer (long since deceased) did not finish his work. The first part only has appeared. Moreover, the statements as to the date of the first imitations (see pp. 83, 108, 109, 118, 121) are not wholly in accord with one another.

I. E. Löbisch, likewise a physician, in his "Entwickelungsgeschichte der Seele des Kindes" ("History of the Development of the Mind of the Child," Vienna, 1851, p. 68), says: "Naturally the first sound formed in the mouth, which is more or less open, while the other organs of speech are inactive, is the sound resembling *a*, which approximates sometimes more, sometimes less, nearly to the *e* and the *o*.*

"Of the consonants the first are those formed by closing and opening the lips: *m*, *b*, *p*; these are at first indistinct and not decidedly differentiated till later; then the *m* naturally goes not only before the *a* but also after it; *b* and *p* for a long time merely commence a syllable, and rarely close one until other consonants also have been formed. A child soon says *pa*, but certainly does not say *ab* until he can already pronounce other consonants also (p. 79).

"The order in which the sounds are produced by the child is the following: Of the vowels, first *a*, *e*, *o*, *u*, of course not well distinguished from *a* at the beginning; the last vowel is *i*. Of the consonants, *m* is the first, and it passes by way of the *w* into *b* and *p*. But here we may express our astonishment that so many writers on the subject of the order of succession of the consonants in the development of speech have assigned so late a date to the formation of the *w*; Schwarz puts it even after *t*, and before *r* and *s*. Then come *d*, *t*; then *l* and *n*; *n* is easily combined with *d* when it precedes *d*; next *f* and the gutturals *h*, *ch*, *g*, *k*, the *g* and *k* often confounded with *d* and *t*. *S* and *r* are regarded as nearly simultaneous in their appearance; the gutturals as coming later, the latest of them being *ch*. Still, there is a difference in this

* The vowels have the Continental, not the English, sounds.

respect in different children. For many produce a sound resembling *r* among the first consonant sounds; so too *ä*, *ö*, *ü*; the diphthongs proper do not come till the last."

These statements of Löbisch, going, as they do, far beyond pure observation, can not all be regarded as having general validity. For most German children, at least, even those first adduced can scarcely claim to be well founded.

H. Taine (in the supplement to his book on "Intelligence," which appeared in a German translation in 1880) noted, as expressions used by a French child in the fifteenth month, *papa*, *maman*, *tété* (nurse, evidently a word taken from the word *têter*, "to nurse or suck at the breast"), *oua-oua* (dog, in all probability a word said for the child to repeat), *koko* (cock, no doubt from *coq-coq*, which had been said for the child), *dada* (horse, carriage, indicating other objects also, no doubt; a demonstrative word, as it is with many German children). *Tem* was uttered without meaning for two weeks; then it signified "give, take, look, pay attention." I suspect that we have here a mutilation of the strongly accentuated *tiens*, which had probably been often heard. As early as the fourteenth month, *ham* signified "I want to eat" (*hamm*, then *am*, might have had its origin in the echo of *faim*, *as-tu faim?* (are you hungry?)). At the age of three and a half months this child formed only vowels, according to the account; at twelve months she twittered and uttered first *m-m*, then *kraaau*, *papa*, with varying intonation, but spoke no word with a recognizable meaning. In the tenth month there was an understanding of some questions. For the child, when asked "Where is grandpapa?" smiled at the portrait of the grandfather, but not at the one of the grandmother, which was not so good a likeness. In the eleventh

month, at the question "Where is mamma?" the child would turn toward her mother, and in like manner toward the father at the question, "papa"?

A second child observed by Taine made utterances that had intellectual significance in the seventh week, for the first time. Up to the age of five months *ah*, *gue*, *gre* (French) were heard; in the seventh month, also *ata*, *ada*.

In his reflections, attached to these and a few other observations of his own, Taine rightly emphasizes the great power of generalization and the peculiarity the very young child had of associating with words it had heard other notions than those common with us; but he ascribes too much to the child's inventive genius. The child guesses more than it discovers, and the very cases adduced (*hamm*, *tem*), on which he lays great weight, may be traced, as I remarked above parenthetically, to something heard by the child; this fact he seems to have himself quite overlooked. It is true, that in the acquirement of speech *one* word may have several different meanings in succession, as is especially the case with the word *bébé* (corresponding to the English word *baby*), almost universal with French children; it is not true that a child without imitation of sounds invents a word with a fixed meaning, and that, with no help or suggestion from members of the family, it employs its imperfectly uttered syllables (Lallsylben) consistently for designating its ideas.

Among the notes of Wyma concerning an English child ("The Mental Development of the Infant of To-day," in the "Journal of Psychological Medicine and Mental Pathology," vii, Part I, pp. 62–69, London, April, 1881), the following, relating to the acquisition of speech, are to be mentioned:

At five months the child began to use a kind of lan-

guage, consisting of six words, to indicate a desire or intention. *Ning* signified desire for milk, and was employed for that up to the age of two years. (The word may possibly have been derived from the word *milk*,* frequently heard.) At nine months the child made use of the words *pretty things* for animals; at ten months it formed many small sentences.

The child practiced itself in speaking, even without direct imitation of words just spoken, for at the age of two years it began to say over a number of nursery rhymes that nobody in the house knew, and that could not have been learned from other children, because the child had no intercourse with such. At a later period the child declared that the rhymes had been learned from a former nurse, whom it had not seen for nearly three months. Thus the articulation was perfecting itself for weeks before it was understood. The exercises of the child sounded like careless reading aloud.

The book of Prof. Ludwig Strümpell, of Leipsic, "Psychologische Pädagogik" (Leipsic, 1880, 368 pages), contains an appendix, "Notizen über die geistige Entwickelung eines weiblichen Kindes während der ersten zwei Lebensjahre" ("Notes on the Mental Development of a Female Child during the First Two Years of Life"); in this are many observations that relate to the learning of speech. These are from the years 1846 and 1847.

In the tenth week, *ah! ah!* was an utterance of joy; in the thirteenth, the child sings, all alone; in the nineteenth comes the guttural utterance, *grrr*, but no consonant is assigned to this period. In the first half-year are

* Or possibly for the word *drink*, which a child of my acquaintance called *ghing*.—EDITOR.

heard distinctly, in the order given, *ei*, *aga*, *eigei*, *ja*, *ede*, *dede*, *eds*, *edss*, *emme*, *meme*, *nene*, *nein*. In the eighth month, there is unmistakable understanding of what is said; e. g., "Where is the tick-tack?" In the ninth, *am*, *amme*, *ap*, *pap*, are said; she sings vowels that are sung for her. In the eleventh month, imitation of sounds is frequent, *kiss*, *kiss;* at sight of the tea-kettle, *ssi*, *ssi;* she knows all the people in the house; calls the birds by the strange name *tibu*. Echolalia. In the fourteenth month, needles are called *tick* (*stich* = prick or stitch). To the question, "Where is Emmy?" the child points, correctly, to herself; says distinctly, *Kopf* (head), *Buch* (book), *roth* (red), *Tante* (aunt), *gut* (good), *Mann* (man), *Baum* (tree); calls the eye (Auge) *ok*, Pruscinsky *prrti*, the dog *uf*, *uf*. In the seventeenth month, simple sentences are spoken; she speaks to herself. In the nineteenth month, she calls herself by her name, and counts *twei*, *drei*, *ümpf*, *exe*, *ibene*, *atte*, *neune* (zwei, drei, fünf, sechs, sieben, acht, neun—2, 3, 5, 6, 7, 8, 9); in the twenty-second month, she talks a good deal to herself, and makes very rapid progress in the correct use of words and the formation of sentences.

From the diary kept by Frau von Strümpell concerning this daughter and a sister of this one, and kindly placed at my disposal in the original, I take the following notes: In the eighth month, *mamma*, in the tenth, *papa*, without meaning. In the eleventh month, the child's understanding of what is said to her is surprising, and so is her imitation. To "Guten Tag" (good-day) she responds, *tata;* to "Adieu," *adaa*. A book, which the child likes to turn the leaves of, she calls *ade* (for a b c). The first certain association of a sound learned with a concept seems to be that of the *ee*, which has often been said to her, with wet, or with what is forbidden. *Amme am*

om, "Amme komm" (nurse come) (both imitative), is most frequently repeated, *papa* seldom. The *r* guttural, or rattled, is imperfectly imitated. In the thirteenth month, the little girl says, *tippa tappa*, when she wants to be carried, and responds *te te* to "steh! steh" (stop)! She now calls the book *a-be-te* (for a b c). Pigeons she calls *kurru;* men, in the picture-book, *mann mann.* When some one asked, "Where is the brush?" the child made the motion of brushing. To the questions, "Where is your ear, your tooth, nose, hand, your fingers, mamma's ear, papa's nose?" etc., she points correctly to the object. On her mother's coming into the room, *mamam;* her father's, *papap.* When the nurse is gone, *amme om, amme am.* The mother asked some one, "Do you hear?" and the child looked at her and took hold of her own ears. To the question, "How do we eat?" she makes the motion of eating. She says *nein* when she means to refuse. "Dank" (thank) is pronounced *dakkn.* "Bitte" (I beg, or please) is correctly pronounced. She understands the meaning of spoon, dress, mirror, mouth, plate, drink, and many other words, and likes to hear stories, especially when they contain the words already known to her. In the fifteenth month "Mathilde" is given by her as *tilda* and *tida.* At sight of a faded bouquet she said *blom* (for Blume, flower). She says everything that is said to her, though imperfectly; produces the most varied articulate sounds; says *ta, papa, ta* when she hands anything to a person; calls the foot (Fuss) *pss*, lisping and thrusting out the tongue. She often says *omama* and *opapa.* In the seventeenth month, Ring is called *ning*, Wagen (carriage), *uagen*, Sophie, *dsofi*, Olga, *olla*, krank (ill), *kank*, Pflaume (plum), *pluma*, satt (satisfied, as to hunger), *datt*, Hände-waschen (washing the hands), *ander-uaschen*, Schuh and Tuch (shoe

and cloth), *tu*, Strumpf (stocking), *tumpf*, Hut (hat), *ut*, Suppe (soup), *duppe*. *Mama kum bild dat bank*, is for "Mama komm, ich habe das Bilderbuch, erzähle mir dazu etwas, dort setz' Dich zu mir" (M., come, I have the picture-book; tell me something in it; sit there by me). In the eighteenth month, "Where is Omama?" is answered with *im garten;* "How are Omama and Opapa?" with *sund* (for gesund, well); "What is Omama doing?" with *näht* (she is sewing). The black Apollo is called *pollo warz* (schwarz, black).

The sister of this child, in the tenth month, applied the word *mama* to her mother, *pap pap* and *papap* to her father, but was less sure in this; *tjē-tē* were favorite syllables. When asked, "Where is Tick-tack?" she looks at the clock on the wall. A piercing scream is an utterance of joy. In the fifteenth month, *Apapa* is her word for grandfather, and is roguishly used for grandmother. She says *aben* for "haben" (have), *tatta* for "Tante" (aunt), *apa* (for *uppa*) means "I want to go up." Her imitation of what is said is very imperfect, but her understanding of it is surprising. In the nineteenth month she makes much use of her hands in gesture instead of speaking. *Kuker* is her word for "Zucker" (sugar), *bildebu* for "Bilderbuch" (picture-book). But she habitually calls a book *omama* or *opapa* (from the letters of her grandparents). Clara is pronounced *clala*, Christine, *titine*. In the twentieth month, her mother, after telling her a story, asked, "Who, pray, is this, I?" and the child replied, "*Mamma*." "And who is that, you?" "*Bertha*, *Bertha*" (the child's name) was the answer. At this period she said, *Bertha will;* also *paren* (for fahren, drive), *pallen* (fallen, fall), *bot*, (Brot, bread), *atig* (artig, good, well-behaved), *mal* (noch einmal, once more), *muna* (Mund, mouth), *aujen* (Augen, eyes), *ol* (Ohr, ear), *tirn* (Stirn, forehead), *wanne*

(Wange, cheek, and Wanne, bath-tub), *aua* (August), *dute* (gute) *mama*, *pāsche* (Equipage), *wasar tinken* (Wasser trinken, drink water) *dabel* (Gabel, fork), *lüssel* (Schlüssel, key), *is nits* (ist nichts, is nothing), *mula* (Milch, milk), *ass* (heiss, hot).

Another remarkable observation is the following from the fifteenth month. It reminds one of the behavior of hypnotized adults. On her grandmother's birthday the child said some rhymes that she did not easily remember (there were six short verses, thirty-four words). One night soon after the birthday festival the little girl said off the verses, "almost for the first time without any stumbling, in her sleep."

From this we see how much more quickly in regard to articulation and independent use of words both these girls (the first of whom weighed only six pounds at birth) learned to speak than did Sigismund's boy, my own boy, and others.

Darwin observed (*A Biographical Sketch of an Infant* in "Mind, a Quarterly Review of Psychology and Philosophy," July, 1877, pp. 285–294) in a son of his, on the forty-seventh day of his life, a formation of sounds without meaning. The child took pleasure in it. The sounds soon became manifold. In the sixth month he uttered the sound *da* without any meaning; but in the fifth he probably began to try to imitate sounds. In the tenth month the imitation of sounds was unmistakable. In the twelfth he could readily imitate all sorts of actions, such as shaking his head and saying "Ah." He also understood intonations, gestures, several words, and short sentences. When exactly seven months old, the child associated his nurse with her name, so that when it was called out he would look round for her. In the thirteenth month the boy used gestures to explain his wishes; for instance,

he picked up a bit of paper and gave it to his father, pointing to the fire, as he had often seen and liked to see paper burned. At exactly the age of a year he called food *mum*, which also signified "Give me food," and he used this word instead of beginning to cry as formerly. This word with affixes signified particular things to eat; thus *shu-mum* signified sugar, and a little later licorice was called *black-shu-mum*. When asking for food by the word *mum* he gave to it a very strongly marked tone of longing (Darwin says an "interrogatory sound," which should mean the same thing). It is remarkable that my child also, and in the tenth week for the first time, said *mömm* when he was hungry, and that a child observed by Fritz Schultze (Dresden) said *mäm-mäm*. Probably the syllable has its origin from the primitive syllable *ma* and from hearing the word "mamma" when placed at the breast of the mother.

Of the facts communicated by the physiologist Vierordt concerning the language of the child ("Deutsche Revue" of January, 1879, Berlin, pp. 29–46) should be mentioned this, that a babe in its second month expressed pleasure by the vowel *a*, the opposite feeling by *ä*. This is true of many other children also. In the third and fourth months the following syllables were recognizable: *mam*, *ämma*, *fu*, *pfu*, *ess*, *äng*, *angka*, *acha*, *erra*, *hab*. A lisping babe said, countless times, *hab*, *hob*, *ha*. These syllables coincide in part with those given by other observers. The *pf* and *ss* only have not been heard by me at this age, and I doubt whether *f*, for which teeth are needed, was produced with purity so early. In the second and third years a child pronounced the following words: *beb* (for bös, naughty); *bebe* (Besen, *beesann*, broom); *webbe* (Wasser, *watja*, water); *wewe* (Löwe, *löwee*, lion); *ewebau* (Elephant, *elafant*); *webenau* (Fledermaus, *leba-*

maunz, bat); *babaube* (Blasebalg, *ba-abats*, bellows); *ade* (Hase, hare); *emele* (Schemel, footstool); *gigod* (Schildkröte, tortoise).

These examples illustrate very well the mogilalia and paralalia that exist in every child, but with differences in each individual. Sigmatism and parasigmatism and paralambdacism are strongly marked. At the same time the influence of dialect is perceptible (Tübingen). The pronunciations given in parentheses in the above instances were regularly used by my boy in his twenty-sixth month when he saw the pictures of the objects named in his picture-book. (In Jena.) One would not suppose beforehand that *watja* and *webbe* have the same meaning. From the ten examples may be seen, further, that *f*, *l*, *r*, *s*, *t* present more difficulties of articulation than *b*, *w*, *m*, *g*, and *d*; but neither must this be made a general conclusion. The *w* (on account of the teeth) regularly comes later than the *b*, *m*, and *r*.

In the third year Vierordt noted down the following narration. I put in brackets the words omitted by the child:

id. mama . . papa gäge	[Es] ist [eine] mama [und ein] papa gewesen
unn die habe wai didi gabt	und diese haben zwei Kinder gehabt,
unn. didi . . . waud.	und [die] Kinder [sind in den] Wald [gegangen]
unn habe ohd duh	und haben Holz geholt;
na . . an e gugeeide guju	dann [sind sie] an ein Zuckerhäuschen gegangen
unn habe gäg	und haben gegessen;
no ad die egg gag	dann hat die Hexe gesagt:
näg näg neidi	"Nucker, Nucker Neisle
wie. immi. eidi	wer [krabbelt] mir am Haüsle?"
no habe die didi gag	dann haben die Kinder gesagt:
die wid, de immi immi wid	["Der Wind, der Wind, das himmlische Kind"] Der Wind, der himmlische, himmlische Wind.

(There were once a mama and a papa, and they had two children. And the children went into the woods and fetched wood. Then they came to a little sugar house and ate. Then the witch said: "Nucker, Nucker Neisle, who is crawling in my little house?" Then the children said: "The wind, the wind, the heavenly child" —The wind, the heavenly, heavenly wind.)

I told the same story to my boy for the first time when he was two years and eighteen days old. He repeated, with an effort:

Ess ets aine mama unn ain papa edam (*wesen*).

unn (*unt*) *diesa abn wais* (*twai*) *kinna* (*tinder*) *ghatf* (*dehappt*).

unn die kinna sint (*dsint*) *in den walt tegang* (*gangen*).

unn-daben (*habn*) *holz* (*olz*) *gehōl* (*ohlt*).

dann sint (*dsint*) *sie an ain utsom-händom* (*zukehäussn*) *zezan* (*gangn*).

unn (*unt*) *habn* (*abn*) *ge . . .* (*dessen*).

dann hatt die hetse (*hekksee*) *dsa* (*tsakt*).

nanuck (*nuke nuke*) *nana nainle* (*naisle*).

wer . . (*drabbelt*) *mir am häultje* (*äusle*).

dann baben (*habn*) *die . . .* (*tinder*) *ze-a* (*dsagt*).

der wiĕds (*wind*) *. . .* (*der fint*).

dsēr wenn daz (*das*) *himmelä* (*immlis*) *khint* (*tint*).

Where the periods are, his attempts were all vain. At any rate, he would say *pta-pta* as he usually did in fruitless efforts at imitating sounds. Just two months after these first attempts, the same child recited for me the narrative, using the expressions in the parentheses; this indicated a distinct progress in articulation. A year after the first attempt, he easily repeated the whole, with only a single error. He still said *himmelä*, and then *himmliss*, for "himmlische."

A third boy (Düsseldorf) repeated the narrative much better, as early as his twenty-fifth month. He made only the following errors, which were noted by his mother, and kindly communicated by her to me:

gewesa	for gewesen	*fai*	for zwei
gehat	" gehabt	*kinner*	" kinder
gehat / *gehakt*	" gesagt	*wlad*	" Wald
		hol-l-l-t	" Holz
gegannen	" gegangen	*uckerhäussen*	" Zuckerhäuschen
hamen	" haben	*hekes*	" Hexe
hind hie	" sind sie	*neissel*	" neisle
kabbell	" krabbelt	*häussel*	" Häusle
himmli-he	" himmlische		

The *ss* between two vowels was imperfect, reminding one of the English "th" and the German "sch" and "s." The child could not at this time be brought to learn by heart.

We see, from these three versions, how unequal the capacity for articulation is in its development, and how varied it is in regard to the omission of difficult consonants and the substitution of others in place of them, as well as in regard to transposition, e. g., in *wand*, *walt*, *wlad* (Wald), *wenn*, *wid*, *wieds*, *fint* (Wind)—and this even in the same individual.

As no one thus far has instituted comparisons of this sort, one more example may be given. The verses taught by Sigismund to his child (for whom I use the sign S) of twenty-one months, were often repeated by my boy (A), of twenty-five months, to me, and by the boy from Düsseldorf (D), in his twenty-fifth month, to his mother:

	S.	A.		D.
	21st month.	25th month.	27th month.	25th month.
Guter	tute	tuten	tuter	guter
Mond	bohnd	monn	mond	Mund
Du gehst	du tehz	du gehts	du dehst	du gehs
so stille	so tinne	so tilte	so tille	ho tille
durch die	duch die	durch die	durch die	durch die
Abendwolken	aten-bonten	aben-woltn	abendwolkn	abehtwolken
hin	in	in	in	hin
gehst so	tehz so	gehts so	dehst so	gehs so
traurig	tautech (atich)	treuja	trauig	terauhig
und ich	und ich	unn ich	und ich	und ich
fühle	büne	felam	fühle	fühle
dass ich	dass ich	dess ich	dass ich	dass ich
ohne Ruhe	one ule	ohno ruhge	ohne ruhe	ohni ruhe
bin	bin	bin	bin	bin
Guter	tute	hotten	tuter	guter
Mond	bohnd	mohn	mond	mond
du darfst	du atz	du dafp	du darfst	du darf
es wissen	es bitten	es witsen	es wissen	es wissen
weil du so	bein du so	leil du so	weil du so	weil du ho
verschwiegen	bieten	wereidsam	verwiegen	werwiegen
bist	bitz	bits	bist	bits
warum	amum	wa-um	warum	wahum
meine	meine	meine	meinhe	meine
Thränen	tänen	tänen	thränen	tänen
fliessen	bieten	flietjam	fliessen	fliessen
und mein	und mein	und mein	und mein	und mein
Herz so	ätz so	hetz so	erst so	hetz ho
traurig ist	atich iz	treutjam its	trauig ist	taudig ist
Errors	24	26	13	18

The errors are very unlike, and are characteristic for each child. The fact that in the case of A the errors diminished by half within two months is to be explained by frequency of recitation. I may add that the inclination to recite was so often lacking that a good deal of pains was required to bring the child to it.

From the vocabulary of the second year of the child's

life, according to the observations of Sigismund and myself, the following words of frequent use are also worthy of notice:

	Vater (father)	Mutter (mother)	Anna	Milch (milk)	Kuh (cow)	Pferd (horse)
S.	*atte*	*amme*	*anne*	*minne*	*muh*	*hotto*
	ätte	*ämme*				*dodo*
	tate	*ämmäm*				*päd*
	fatte	*mämme*				
		matte				
P.	*va-ata*	*mama*	*anna*	*mimi*	*mumuh*	*otto*
	papa				*mukuh*	*pfowed*
						fowid

	Vogel (bird)	Mund (mouth)	Nase (nose)	Ohr (ear)	Haare (hair)	Finger	Da (there)
S.	*piep-piep*	*mund*	*ase*	*ohn*	*ale*	*finne*	*da*
P.	*piep, pipiep*	*mum*	*nane*	*o-a*	*ha-i*	finge wi-er	*da*

	Adieu	Guten Tag (good-day)	Fort (away)	Ja (yes)	Nein (no)
S.	*adé*	*tag*	*fot*	*ja*	*nein*
P.	*adjee*	*tatach*	*wott*	*ja; jaja*	*neinein*

	Grossmutter (grandmother)	Kuk	Zucker (sugar)	Karl	Grete
S.	*tosutte*	*o-tute*	*zucke*	*all*	*ete*
	abutte				
	osmutte				
P.	*a-mama*	*kuk*	*ucka*	*kara*	*dete*
	e-mama				

Sigismund noticed the following names of animals (in imitation of words given to the children): *bä*, *put*, *gikgak*, *wäkwäk*, *huhu*, *ihz* (Hinz). I did not find these with my child. Sigismund likewise observed *baie-baie* for Wiege (cradle), which my child was not acquainted with; *päpä* for verborgen (hidden); *eichönten* for Eichhörnchen

(squirrel); *äpften* for Äpfelchen (little apple); *mädsen* and *mädis* for Mädchen (girl); *atatt* for Bernhard; *hundis* for Hundchen, the Thüringian form of Hündchen (little dog); *pot* for Topf (pot); *dot* for dort (yonder). On the other hand, both children used *wehweh* for Schmerz (pain); *caput* for zerbrochen (broken to pieces); *schoos*, *sooss* for "auf den Schooss möcht ich" (I want to get up in the lap); *auf* for "hinauf möchte ich gehoben werden" (I want to be taken up); *toich* for Storch (stork); *tul* for Stuhl (chair). A third child in my presence called his grandmother *mama-mama*, i. e., twice-mamma, in distinction from the mother. This, however, does not necessarily imply a gift for invention, as the expression "Mamma's Mamma" may have been used of the grandmother in speaking to the child.

Other children of the same age do very much the same. The boy D, though he repeated cleverly what was said, was not good at naming objects when he was expected to do this of himself. He would say, e. g., *pilla* for Spiegel (mirror). At this same period (twenty-five months) he could not yet give the softened or liquid sound of consonants (mouilliren). He said *n* and *i* and *a* very plainly, and also *i-a*, but not *nja*, and not once "ja"; but, on the contrary, always turned away angrily when his father or I, or others, required it of him. But as late as the twenty-eighth month echolalia was present in the highest degree in this very vigorous and intelligent child, for he would at times repeat mechanically the last word of every sentence spoken in his hearing, and even a single word, e. g., when some one asked "Warum?" (why) he likewise said *warum* without answering the question, and he continued to do it for days again and again in a vacant way, with and without the tone of interrogation (which he did not understand). From this we see again plainly that the

imitation of sounds is independent of the understanding of them, but is dependent on the functions of articulation.

These functions are discussed by themselves in the work of Prof. Fritz Schultze, of Dresden, "Die Sprache des Kindes" ("The Language of the Child," Leipsic, 1880, 44 pp.). The author defends in this the "principle of the least effort." He thinks the child begins with the sounds that are made with the least physiological effort, and proceeds gradually to the more difficult sounds, i. e., those which require more "labor of nerve and muscle." This "law" is nothing else than the "loi du moindre effort" which is to be traced back to Maupertuis, and which was long ago applied to the beginnings of articulation in children: e. g., by Buffon in 1749 ("Œuvres complètes," Paris, 1844, iv, pp. 68, 69), and, in spite of Littré, again quite recently by B. Perez* ("Les trois premières Années de l'Enfant," Paris, 1878, pp. 228–230, *seq.*) But this supposed "law" is opposed by many facts which have been presented in this chapter and the preceding one. The impossibility of determining the degree of "physiological effort" required for each separate sound in the child, moreover, is well known. Besides, every sound may be produced with very unequal expenditure of force; but the facts referred to are enough for refutation of the theory. According to Schultze, e. g., the vowels ought, in the process of development of the child's speech, to appear in the following order, separated in time by long intervals: 1. Ä; 2. A; 3. U; 4. O; 5. E; 6. I; 7. Ö; 8. Ü. It is correct that *ä* is one of the vowels that may be first plainly distinguished; but neither is it the first vowel audible

* "The First Three Years of Childhood," edited and translated by Alice M. Christie; published in Chicago, 1885.

—on the contrary, the first audible vowel is indistinct, and imperfectly articulated vowels are the first—nor can we admit that *ä* is produced with less of effort than is *a*. The reverse is the case. Further, *ö* is said to present "enormous difficulties," and hence has the place next to the last; but I have often heard the *ö*, short and long, perfectly pure in the second month, long before the *i*, and that not in my child alone. From the observations upon the latter, the order of succession appears to be the following: Indeterminate vowels, *u*, *ä*, *a*, *ö*, *o*, *ai*, *ao*, *i*, *e*, *ü*, *oeu* (French sound in cœur), *au*, *oi*. Thus, for the above eight vowels, instead of 1, 2, 3, 4, 5, 6, 7, 8, the order 3, 1, 2, 7, 4, 6, 5, 8, so that only *i* and *ü* keep their place. But other children give a varying order, and these differences in the order of succession of vowels as well as of consonants will certainly not be referred to the "influence of heredity." Two factors of quite another sort are, on the contrary, to be taken into account here in the case of every normal child without exception, apart from the unavoidable errors in every assigned order growing out of incomplete observation. In the earliest period and when the babbling monologues begin, the cavity of the mouth takes on an infinitely manifold variety of forms—the lips, tongue, lower jaw, larynx, are moved, and in a greater variety of ways than ever afterward. At the same time there is expiration, often loud expiration, and thus originates entirely at random sometimes one sound, sometimes another. The child *hears* sounds and tones new to him, hears his own voice, takes pleasure in it, and delights in making sounds, as he does in moving his limbs in the bath. It is natural that he should find more pleasure in some sounds, in others less. The first are more frequently made by him on account of the motor memories that are associated with the acoustic memories, and an observer does not hear the

others at all if he observes the child only from time to time. In fact, however, almost all simple sounds, even the most difficult, are formed in purity before they are used in speaking in the first eight months—most frequently those that give the child pleasure, that satisfy his desires, or lessen his discomfort. It is not to be forgotten that even the *ä*, which requires effort on account of the drawing back and spreading out of the tongue, diminishes discomfort. The fretful babe feels better when he cries *u-ä* than when he keeps silent. The second factor is determined by the surroundings of the child. Those sounds which the child distinctly hears he will be able to imitate correctly sooner than he will other sounds: but he will be in condition to hear most correctly, first of all, the sounds that are most frequent, just because these most frequently excite the auditory nerve and its tract in the brain; secondly, among these sounds that are acoustically most sharply defined, viz., first the vowels, then the resonants (m, n, ng); last, the compound "friction-sounds" (fl, schl). But it is only in part that the surroundings determine this order of succession for the sounds. Another thing that partly determines and modifies this order is the child's own unwearied practice in forming consonant-sounds. He hears his own voice now better than he did at an earlier period when he was forming vowels only. He most easily retains and repeats, among the infinitely manifold consonants that are produced by loud expiration, those which have been distinctly heard by him. This is owing to the association of the motor and the acoustic memory-image in the brain. These are the most frequent in his speech. Not until later does the mechanical difficulty of articulation exert an influence, and this comes in at the learning of the compound sounds. Hence there can not be any chronological order of succession of sounds that holds

good universally in the language of the child, because each language has a different order in regard to the frequency of appearance of the sounds; but heredity can have no influence here, because every child of average gifts, though it may hear from its birth a language unknown to its ancestors, if it hears no other, yet learns to speak this language perfectly. What is hereditary is the great plasticity of the entire apparatus of speech, the voice, and with it a number of sounds that are not acquired, as *m*. An essential reason for the defective formation of sounds in children born deaf is the fact that they do not hear their own voice. This defect may also be hereditary.

The treatise of F. Schultze contains, besides, many good remarks upon the *technique* of the language of the child, but, as they are of inferior psychogenetic interest, they need not be particularly mentioned here. Others of them are only partially confirmed by the observations, as is shown by a comparison with what follows.

Gustav Lindner ("Twelfth Annual Report of the Lehrer-seminars at Zschopau," 1882, p. 13) heard from his daughter, in her ninth week, *arra* or *ärrä*, which was uttered for months. Also *äckn* appeared early. The principle of the least effort Lindner finds to be almost absolutely refuted by his observations. He rightly remarks that the frequent repetitions of the same groups of sounds, in the babbling monologues, are due in part to a kind of pleasure in success, such as urges adults also to repeat their successful efforts. Thus his child used to imitate the reading of the newspaper (in the second half-year) by *degattegattegatte*. In the eleventh and twelfth months the following were utterances of hers in repeating words heard: *ómama*, *oia* (Rosa), *batta* (Bertha), *ächard* (Richard), *wiwi* (Friedchen), *agga* (Martha), *olla olla* (Olga, her own name). Milch (milk) she called *mimi*, Stuhl (chair)

tuhl, Laterne (lantern), *katonne*, the whistle of an engine in a neighboring factory, *wuh* (prolonged, onomatopoetic), Paul, *gouch*, danke (thank you), *dagn* or *dagni*, Baum (tree), *maum*. Another child substituted *u* for *i* and *e*, saying *hund* for "Kind," and *uluwant* for "Elephant"; thus, *ein fomme hund lass wäde much* for "ein frommes Kind lass werden mich" (let me become a pious child). Lindner's child, however, called "werden" not *wäde* but *wegen;* and "turnen" she called *tung*, "blau" *balau*. At the end of the second year no sound in the German language presented difficulties to the child. Her pronunciation was, however, still incorrect, for the correct pronunciation of the separate sounds does not by any means carry with it the pronunciation of them in their combinations. This remark of Lindner's is directly to the point, and is also confirmed, as I find, by the first attempts of the child of four years to read a word after having learned the separate letters. The learning of the correct pronunciation is also delayed by the child's preference of his original incorrect pronunciation, to which he is accustomed, and which is encouraged by imitations of it on the part of his relatives. Lindner illustrates this by good examples. His child continued to say *mimela* after "Kamilla" was easy for him. Not till the family stopped saying it did "Kamilla" take its place. At the age of three and a half years the child still said *gebhalten* for "behalten" and *vervloren* for "verloren," as well as *gebhüte* for "behüte." "Grosspapa" was called successively *opapa*, *gropapa*, *grosspapa*. Grossmama had a corresponding development. "Fleisch" (meat) was first called *jeich*, then *leisch;* "Kartoffeln" (potatoes) *kaffom*, then *kaftoffeln;* "Zschopau" *sopau*, *schodau*, *tschopau;* "Sparbüchse" (savings-box) *babichse*, *spabichse*, *spassbüchse*, *sparzbüchse;* "Häring" (herring, also gold-fish) *hänging*. A sound out of the second sylla-

ble goes into the first. The first question, *isn das?* from "Was ist denn das?" (what is that, pray?) was noticed in the twentieth month; the interrogative word *was?* (what) in the twenty-second month. Wo? (where) and Wohin? (whither) had the same meaning (that of the French *où?*), and this as late as in the fourth year. The word "Ich" (I) made its appearance in the thirtieth month. As to verbs, it is to be mentioned that, with the child at two years of age, before the use of the tenses there came the special word denoting activity in general: thus he said, when looking at a head of Christ by Guido Reni, *thut beten*, instead of "betet" ("does pray," instead of "prays"). The verb "sein" (be) was very much distorted: *Warum warst du nicht fleissig gebist?* (gebist for gewesen) (why have you not been industrious?). (Cf., pp. 172, 177.) He inflected *bin*, *binst* (for bist), *bint* (ist), *binn* (sind), *bint* (sind and seid), *binn* (sind). Further, *wir isn* (wir sind, we are), and *nun sei ich ruhig* (sei for bin) (now I am quiet), and *ich habe nicht ruhig geseit* (*habe* for "bin" and *geseit* for "gewesen") (I have not been quiet), are worthy of note, because they show how strong an influence in the formation of words during the transition period is exerted by the forms most frequently heard—here the imperative. The child used first of all the imperative; last the subjunctive. The superlative and comparative were not used by this child until the fourth year.

The observations of Lindner (edited anew in the periodical "Kosmos" for 1882) are among the best we have.

In the case of four brothers and sisters, whose mother, Frau Dr. Friedemann, of Berlin, has most kindly placed at my disposal trustworthy observations concerning them, the first articulate sounds heard were *ärä*, *hägä*, *äche*, and a deep guttural, rattling or snarling sound (Schnarren); but the last was heard from only one of the children.

The above syllables contain three consonants (*r*, *h*, *ch*) that are declared by many, wrongly, to be very late in their appearance. These children in their first attempts at speaking often left out the first consonant of a word pronounced for them, or else substituted for it the one last heard, as if their memory were not equal to the retaining of the sounds heard first: e. g., in the fifteenth month they would say *tĕ*, *t* for *Hut* (hat), *Lale* for *Rosalie;* in the twenty-fourth, *kanke* for *danke* (thank you), *kecke* for *Decke* (covering), *kucker* for *Zucker* (sugar), *huch*, *huche* for *Schuh*, *Schuhe* (shoe, shoes), fifteenth month. In the last two cases comes in, to explain the omission, also the mechanical difficulty of the *Z* and *Sch*. The oldest of these children, a girl, when a year old, used to say, when she refused anything, *ateta*, with a shake of the head. She knew her own image in the glass, and pointed at it, saying *täte* (for *Käte*). In the following table the Roman figures stand for the month; F_1, F_2, F_3, F_4, for the four children in the order of their ages. No further explanation will be needed:

VIII. *papa* distinctly (F_1); *dada*, *da*, *deda*, first syllables (F_4); *derta* for *Bertha* (F_1).

X. *dada*, name for all possible objects (F_2); *papa* (F_3); *ada*, *mama*, *detta* (F_4).

XII. *puppe* (doll) correctly; *täte* for *Käte* (F_1); *ida*, *papa*, *tata* for *Tante* (aunt); *täte* (F_4).

XIII. *mama*, *detta* for *Bertha; wauwau* (F_2); *lala* (F_4).

XIV. *ba* for *baden* (bathe) (F_2).

XV. *hia* for *Ida; ate* for *artig* (well-behaved); *da* for *danke; bappen* for *essen* (eat); *piep; ja*, *nein* (yes, no) correctly (F_1).

XVI. *ei* (egg) correctly; *feisch* for *Fleisch* (meat); *waffer* for *Wasser* (water); *wuffe* for *Suppe* (F_1); *tatte* for *Tante; tittak; Hut* (F_3).

XIX. *at* for *Katze* (cat); *duh* for *Kuh* (cow); *wān* for *Schwan* (swan); *nine* for *Kaninchen* (rabbit); *betta* for *Blätter* (leaves); *butta* for *Butterblume* (buttercup); *fiedemann* for *Friedemann; täti* for *Käti* (F_1); *gad* for *gerade* (straight); *kumm* for *krumm* (crooked) (F_3).

XX. *fidat* for *Zwieback* (biscuit); *tierdatten* for *Thiergarten* (zoölogical garden); *waden* for *wagen* (carriage); *nähnaden* for *Nähnadel* (needle); *wewette* for *serviette* (napkin); *teid* for *Kleid* (dress); *weife* for *Seife* (soap); *famm* for *Schwamm* (sponge); *tonnat* for *Konrad; potne* for *Portemonnaie; hauf* for *herauf* (up here); *hunta* for *herunter* (down here); *hiba papa* for *lieber* (dear) *papa* (F_1); *tü* for *Thür* (door); *bau* for *bauen* (build); *teta* for *Käte; manna* for *Amanda; ta* for *guten Tag* (good-day); *ku* for *Kugel* (ball) (F_2); *appudich* for *Apfelmuss* (apple-sauce); *mich* for *Milch* (milk); *ule pomm* for *Ulrich komm* (Ulrich come); *ku* for *Kuchen* (cake); *lilte* for *Mathilde* (F_3).

XXI. *teine* for *Steine* (stones); *bimelein* for *Blümelein* (little flowers); *mamase* for *Mamachen* (little mama); *tettern* for *klettern* (climb); *Papa weint nis* (Papa doesn't cry), first sentence (F_1); *Mamase, Täte artig—Tuss* (means *Mamachen, Käte ist wieder artig, gib ihr einen Kuss*) (Mamma, darling, Katy is good again, give her a kiss) (F_1); *Amanda's Hut, Mamases Hirm* (for Schirm) (Amanda's hat, mamma's umbrella), first use of the genitive case (F_1); *Mein Buch* (my book); *dein Ball* (thy ball) (F_1); *das?* for *was ist das?* (what is that?) in the tone of interrogation (F_1) *dida* for *Ida; lala* for *Rosalie; fadi* for *Fahne* (flag); *büda* for *Brüderchen* (little brother); *hu-e* for *Schuhe* (shoes); *mai maich*, for *meine Milch* (my milk) (F_2).

XXII. *kusch* for *Kuss* (kiss); *sch* generally used instead of *s* for months (F_3).

XXIII. *koka* for *Cacao; batt* for *Bett* (bed); *emmu* for *Hellmuth* (light-heartedness); *nanna mommom* (Bonbon); *papa, appel* for *Papa, bitte einen Apfel* (Papa, please, an apple) (F_2); *petscher* for *Schwester* (sister); *till* for *still; bils* for *Milch; hiba vata* for *lieber Vater* (dear father) (F_3).

XXIV. *pija eine* for *eine Fliege* (a fly); *pipik* for *Musik*. Sentences begin to be formed (F_3).

XXV. *pater* for *Vater* (father); *appelsine* for *Apfelsine* (orange) (F_2).

All these observations confirm my results in regard to articulation, viz., that in very many cases the more difficult sounds, i. e., those that require a more complicated muscular action, are either omitted or have their places supplied by others; but this rule does not by any means hold good universally: e. g., the sound preferred by F_3, *sch*, is more difficult than *s*, and my child very often failed to produce it as late as the first half of the fourth year.

In the twenty-second month, in the case of the intelligent little girl F_1, numbering began suddenly. She took small stones from a table in the garden, one after another, and counted them distinctly up to the ninth. The persons present could not explain this surprising performance (for the child had not learned to count) until it was discovered that on the previous day some one had counted the stairs for the child in going up. My child did not begin to count till the twenty-ninth month, and, indeed, although he knew the numbers (their names, not their meaning), he counted only by adding one to one (cf. above, p. 172). Sigismund's boy, long before he formed sentences, on seeing two horsemen, one following the other at a short interval, said, *eite* (for Reiter)! *noch eins!* This proves the activity of the faculty of numbering.

The boy F_3, at the age of two and two thirds years, still said *schank* for *Schrank* and *nopf* for *Knopf*, and, on being told to say *Sch-r-ank* plainly, he said *rrr-schank*. This child from the thirty-first month on made much use of the interrogative words. *Warum? weshalb?* he asked at every opportunity; very often, too, *was? wer? wo?* (Why? wherefore? what? who? where?); sometimes *was?* four or five times when he had been spoken to. When the meaning of what had been said was made plain, then the child stopped asking questions.

The little girl F_4, in her thirteenth month, always says, when she sees a clock, *didda* (for "tick-tack," which has been said to her), and imitates with her finger the movement of the pendulum. It was noticed of this child that, when not yet five months old, she would accompany a song, sung for her by her mother, with a continuous, drawling *äh-äh-äh;* but, as soon as the mother stopped, the child became silent also. The experiment was one day (the one hundred and forty-fifth of the child's life) repeated nine times, with the same result.

I have myself repeatedly observed that babes in the fourth month respond to words spoken in a forcible, pleasant manner with sounds indeterminate often, with *ö-ĕ* and other vowels. There is no imitation in this, but a reaction that is possible only through participation of the cerebrum, as in the case of the joyous sounds at music at an earlier period.

The date at which the words heard from members of the family are for the first time clearly imitated, and the time when the words of the mother-tongue are first used independently, depends, undoubtedly, with children in sound condition, chiefly upon the extent to which people occupy themselves with the children. According to Heinr. Feldmann (*De statu normali functionum corporis hu-*

mani. Inaugural dissertation, Bonn, 1833, p. 3), thirty-three children spoke for the first time (*prima verba fecerunt*) as follows:

14	15	16	17	18	19	Month.
1	8	19	3	1	1	Children.

Of these there could walk alone

8 9	10	11 12	Month.
3	24	6	Children.

According to this, it is generally the case (the author presumably observed Rhenish children) that the first independent step is taken in walking several months earlier than the first word is spoken. But the statement of Heyfelder is not correct, that the average time at which sound children learn to walk ("laufen lernen") comes almost exactly at the completion of the twelfth month. The greater part of them are said by him to begin to walk a few days before or after the 365th day. R. Demme observed that the greater part began to walk between the twelfth and eighteenth months, and my inquiries yield a similar result. Sigismund's boy could run before he imitated words and gestures, and he did not yet form a sentence when he had more than sixty words at his command. Of two sisters, the elder could not creep in her thirteenth month, could walk alone for the first time in the fifteenth month, step over a threshold alone in the eighteenth, jump down alone from a threshold in the nineteenth, run nimbly in the twentieth; the younger, on the other hand, could creep alone cleverly at the beginning of the tenth month, even over thresholds, could take the first unsteady steps alone in the thirteenth, and stride securely over the threshold alone in the fifteenth. In spite of this considerable start the younger child was not, by a great deal, so far advanced

in articulation, in repeating words after others, and in the use of words, in her fifteenth month, as the elder was in her fifteenth. The latter spoke before she walked, the former ran before she spoke (Frau von Strümpell). My child could imitate gestures (beckoning, clinching the fist, nodding the head) and single syllables (*heiss*), before he could walk, and did not learn to speak till after that; whereas the child observed by Wyma could stand firmly at nine months, and walk soon after, and he spoke at the same age. Inasmuch as in such statistical materials the important thing is to know what is meant by "speaking for the first time," whether it be saying *mama*, or imitating, or using correctly a word of the language that is to be spoken later, or forming a sentence of more than one word—and yet on these points data are lacking—we can not regard the laborious inquiries and collections as of much value. Children in sound condition walk for the most part before they speak, and understand what is said long before they walk. A healthy boy, born on the 13th of July, 1873, ran alone for the first time on the 1st of November, 1874, and formed his first sentence, *hia muta ji* ("Marie! die Mutter ist ausgegangen," *ji* = adieu) (Mary, mother has gone out), on the 21st of November, 1875, thus a full year later (Schulte).

More important, psychogenetically, are observations concerning the forming of new words with a definite meaning before learning to speak—words not to be considered as mutilations, imperfectly imitated or onomatopoetic forms (these, too, would be imitations), or as original primitive interjections. In spite of observations and inquiries directed especially to this point, I have not been able to make sure that any inventions of that sort are made before there has taken place, through the medium of the child's relatives, the first association of ideas with

articulate sounds and syllables. There is no reason for supposing them to be made by children. According to the foregoing data, they are not thus made. All the instances of word-inventions of a little boy, communicated by Prof. S. S. Haldemann, of the University at Philadelphia, in his "Note on the Invention of Words" ("Proceedings of the American Philological Association," July 14, 1880) are, like those noted by Taine, by Holden (see below), by myself, and others, onomatopoetic (imitative, pp. 160, 91). He called a cow *m*, a bell *tin-tin* (Holden's boy called a church-bell *ling-dong-mang* [communicated in correspondence]), a locomotive *tshu*, *tshu*, the noise made by throwing objects into the water *boom*, and he extended this word to mean throw, strike, fall, spill, without reference to the sound). But the point of departure here, also, was the sound. In consideration of the fact that a sound formed in imitation of it, that is, a repetition of the tympanic vibrations by means of the vibrations of the vocal cords, is employed as a *word* for a phenomenon associated with the sound—that this is done by means of the faculty of generalization belonging to children that are intelligent but as yet without speech—it is perfectly allowable, notwithstanding the scruples and objections of even a Max Müller, to look for the origin of language in the imitation of sounds and the repetition of our own inborn vocal sounds, and so in an imitation. For the power of forming concepts must have manifested itself in the primitive man, as is actually the case in the infant, by movements of many sorts before articulate language existed. The question is, not whether the roots of language originated onomatopoetically or interjectionally, but simply whether they originated through imitation or not. For interjections, all of them, could in no way come to be joined together so as to be means of mutual understand-

ing, i. e., words, unless one person imitated those of another. Now if the alalic child be tested as to whether he forms new words in any other way than by imitation and transformation of what he imitates, i. e., whether he forms them solely of his own ability, be it by the combination of impulsive sounds of his own or of sounds accidentally arising in loud expiration, we find no sure case of it. Sound combinations, syllables—and those not in the least imitated—there are in abundance, but that even a single one is, without the intervention of the persons about the child, constantly associated with one and the same idea (before other ideas have received their verbal designation—likewise by means of the members of the family—and have been made intelligible to the child), can not be shown to be probable. My observations concerning the word *atta* (p. 122 *et al.*) would tend in that direction, were it not that the *atta*, uttered in the beginning without meaning, had first got the meaning of "away," through the fact that *atta* was once said by somebody at going away.

So long as proof is wanting, we can not believe that each individual child discovers anew the fundamental fact of the expression of ideas by movements of the tongue; but we have to admit that he has inherited the faculty for such expression, and simply manifests it when he finds occasion for imitations.

The first person that has attempted to fix the *number* of all the words used by the child, independently, before the beginning of the third year of life (and these only), is an astronomer, E. S. Holden, director of the Observatory of the University at Madison, Wisconsin. His results in the case of three children have been recently published (in the "Transactions of the American Philological Association," 1887, pp. 58–68).

Holden found, by help of Webster's "Unabridged Dictionary," his own vocabulary to consist of 33,456 words, with a probable error of one per cent. Allowing a probable error of two per cent, his vocabulary would be comprised between the limits of 34,125 words and 32,787 words. A vocabulary of 25,000 words and over is, according to the researches of himself and his friends, by no means an unusual one for grown persons of average intelligence and education.

Holden now determined in the most careful manner the words actually used by two children during the twenty-fourth month of their lives. A friend in England ascertained the same for a third child. All doubtful words were rigidly excluded. For example, words from nursery rhymes were excluded, unless they were independently and separately used in the same way with words of daily and common use. In the first two cases the words so excluded are above 500 in number. Again, the names of objects represented in pictures were not included unless they were often spontaneously used by the children. The lists of words are presented in the order of their initial letters, because the ease or difficulty of pronouncing a word, the author is convinced, largely determines its early or late adoption. In this I can not fully agree with him, on the ground of my own experience (particularly since I have myself been teaching my child English, in his fourth year; he learns the language easily). It is not correct that the pronunciation rather than the meaning makes the learning of a word difficult. Thus, in all three of Holden's cases, the words that have the least easy initial (s) predominate; the child, however, avoided them and substituted easy ones. Holden makes no mention of this; and in his list of all the words used he puts together, strangely, under one and the same letter, without regard to their

sound- (phonic) value, vocables that begin with entirely different sounds. Thus, e. g., under *c* are found *corner* (*k*), *chair* (tsch), *cellar* (*s*); under *k*, actually *knee* (*n*) and *keep* (*k*), and, under *s*, words that begin with the same *s*-sound as in *cellar*, e. g., *soap*, and also words beginning with the *sch*-sound, *sugar*, and with *st*, *sw*, *sm*, and many others. As the words of the three children are grouped, not according to the *sounds* with which they begin, but according to their initial *letters*, into twenty-six classes, the author's conclusions can not be admitted. The words must first all be arranged according to their initial *sounds*. When this task is accomplished, which brings *no* and *know*, e. g., into one class, *wrap* and *rag* into a second—whereas they were put in four different classes—then we find by no means the same order of succession that Holden gives. The author wrote to me, however, in 1882, that his oldest child *understood* at least 1,000 words more than those enumerated here, i. e., than those published by him, and that with both children facility of pronunciation had more influence in regard to the use of words than did the ease with which the words could be understood; this, however, does not plainly follow from the printed statements before me, as he admits. When the first-born child was captivated by a new word, she was accustomed to practice it by herself, alone, and then to come and employ it with a certain pride. The second child did so, too, only in a less striking manner. The boy, on the contrary, who was four years old in December, 1881, and who had no ear for music and less pride than his sisters, did not do as they did.

Further, the statements of the number of all the nouns, adjectives, verbs, and adverbs used by a child of two years are of interest, although they present several errors: e. g., *supper* makes its appearance twice in the case of the same

child under *s*, and *enough* figures as an adjective. For the three girls, in their twenty-fourth month, the results were:

Parts of Speech.	First child.	Second child.	Third child.
Nouns	285	230	113
Verbs	107	90	30
Adjectives	34	37	13
Adverbs	29	17	6
Other parts of speech	28	25	11
Total	483	399	173

A fourth child, brother of the first and second, made use (according to the lists kindly communicated to me by the author), in his twenty-fourth month, of 227 nouns—some proper names among them—105 verbs, 22 adjectives, 10 adverbs, and 33 words of the remaining classes (all these figures being taken from the notes of the child's mother).

From these four vocabularies of the twenty-fourth month it plainly results that the stock of words and the kinds of words depend primarily on the words most used in the neighborhood of the child, and the objects most frequently perceived; they can not, therefore, be alike in different children. The daughters of the astronomer, before their third year, name correctly a portrait of Galileo, and one of Struve. A local "tone," or peculiarity of this sort, attaches to every individual child, a general one to the children of a race. I may add that the third child (in England) seems to have been less accurately observed than the others (in Madison, Wisconsin). Great patience and attention are required to observe and note down every word used by a child in a month.

Without mentioning the name of Holden, but refer-

ring to his investigations, which, in spite of the defects mentioned, are of the very highest merit, M. W. Humphreys, Professor of Greek in Vanderbilt University, Nashville, has published a similar treatise, based on observations of his own ("A Contribution to Infantile Linguistic," in the "Transactions of the American Philological Association," 1880, xi, pp. 6–17). He collected, with the help of a dictionary, all the words that a little girl of just two years "had full command of," whether correctly pronounced or not, and whether they appeared exactly in the twenty-fourth month or earlier. He simply required to be convinced that every one of the words was understood and had been spontaneously used, and could still be used. He did not include proper names, or words (amounting to hundreds) from nursery-rhymes, or numerals, or names of the days of the week, because he was not sure that the child had a definite idea associated with them. The vocabulary thus numbered 1,121 words: 592 nouns, 283 verbs, 114 adjectives, 56 adverbs, 35 pronouns, 28 prepositions, 5 conjunctions, and 8 interjections. In this table irregular verb- and noun-forms are not counted as separate words, except in the case of defective verbs, as *am*, *was*, *been*. The author presents the 1,121 words according to their classification as parts of speech, and according to initial *letters*, not according to initial *sounds*, although he himself declares this an erroneous proceeding, as I did in discussing Holden's paper. The only reason for it was convenience.

In the adoption of a word by the child, difficulty of utterance had some influence in the *first* year; when the little girl was two years old, this had ceased to have any effect whatever. She had by that time adopted certain substitutes for letters that she could not pronounce, and words containing these letters were employed by her as

freely as if the substitutes had been the correct sounds. In regard to the meaning, and the frequency of use dependent upon it, it is to be observed that the simplest ideas are most frequently expressed. When two words are synonymous, one of them will be used exclusively by a child, because of the rarer employment of the other by persons speaking in the child's presence. Here, too, the local "tone" that has been mentioned made itself felt; thus, the little girl used the word "crinoid" every day, to designate sections of fossil crinoid stems which abounded in neighboring gravel walks.

As to parts of speech, nouns were most readily seized; then, in order, verbs, adjectives, adverbs, pronouns. Prepositions and conjunctions the child began to employ early, but acquired them slowly. Natural interjections—*wah*, for instance—she used to some extent from the beginning; conventional ones came rather late.

The following observations by Humphreys are very remarkable, and are, in part, up to this time unique:

When about four months old the child began a curious and amusing mimicry of conversation, in which she so closely imitated the ordinary cadences that persons in an adjacent room would mistake it for actual conversation. The articulation, however, was indistinct, and the vowel-sounds obscure, and no attempt at separate words, whether real or imaginary, was made until she was six months old, *when she articulated most syllables distinctly*, without any apparent effort.

When she was eight months old it was discovered that she knew by name every person in the house, as well as most of the objects in her room, and the parts of the body, especially of the face. She also understood simple sentences, such as, "Where is the fire?" "Where is the baby in the glass?" to which she would reply by pointing. In

the following months she named many things correctly, thus using words as words in the proper sense. The pronunciation of some final consonants was indistinct, but all initial consonants were distinctly pronounced, except *th*, *t*, *tl*, *n*, *l*. These the child learned in the eleventh month. At this period she could imitate with accuracy any sound given her, and had a special preference for *ng* (*ngang*, *ngeng*), beginning a mimicry of language again, this time using real or imaginary words, without reference to signification. But an obscurity of vowel-sounds had begun again. After the first year her facility of utterance seemed to have been lost, so that she watched the mouths of others closely when they were talking, and labored painfully after the sounds. Finally, she dropped her mimicry of language, and, at first very slowly, acquired words with the ordinary infant pronunciation, showing a preference for labials (*p*, *b*, *m*) and linguals (*t*, *d*, *n*, not *l*). Presently she substituted easy sounds for difficult ones. In the period from eighteen months to two years of age, the following defects of articulation appeared regularly: *v* was pronounced like *b*, *th* (*this*) like *d*, *th* (*thin*) like *t*, *z* like *d*, *s* like *t*, *r* like *w*, *j* like *d*, *ch* like *t*, *sh* like *t*; further:

Initial.	Final.
f like *w*,	*f* like *p*,
l not at all,	*l* correctly,
g like *d*,	*g* correctly,
k like *t*,	*k* correctly,

and in general correctly, *m*, *b*, *p*, *n*, *d*, *t*, *h*, *ng*, *w*. On the other hand, the initial sounds *bl*, *br*, *pl*, *pr*, *fl*, *fr*, *dr*, *tr*, *thr*, *sp*, *st*, became *b*, *b*, *p*, *p*, *w*, *w*, *d*, *t*, *t*, *p*, *t*; and the initial sounds *sk*, *sw*, *sm*, *sn*, *sl*, *gl*, *gr*, *kw*, *kl*, *kr*, *hw*, became *t*, *w*, *m*, *n*, *t* (for *s*), *d*, *w*, *w*, *t*, *w*, *hw* (*h* weak). The letter *y* was not pronounced at all, at first.

From this table, as Humphreys rightly observes, may

be drawn the following conclusions in regard to the initial sounds of words:

When a letter which could be pronounced correctly preceded another, the first was retained, but, if both were represented by substitutes, the second was retained. If, however, the second was one which the child made silent, then she pronounced the first. Thus, $tr = t$, $kr = w$ (for r), $kl = t$ (for k, l being one of her silent letters). With these results should be compared those presented in regard to German children, in the paper of Fritz Schultze (p. 239 above) (which likewise are not of universal application).

The accent was for the most part placed on the last syllable. Only one case of the invention of a new word could be established. When the child was about eighteen months old, a fly flew all about her plate when she was eating, and she exclaimed, "The old fly went wiggely-waggely." But at this time the child had already learned to speak; she knew, therefore, that perceptions are expressed by words. Notwithstanding, the original invention remains remarkable, unless there may be found in it a reminiscence of some expression out of nursery-talk (cf., p. 238). Until the eighteenth month, "no" signified both "yes" and "no."

At the end of two years subordinate propositions were correctly employed. This was the case also with a German girl in Jena, who, for instance, said, "The ball which Puck has" (P. Fürbringer). In the case of my boy such sentences did not make their appearance till much later.

I had hoped to find trustworthy observations in several other works besides those mentioned. Their titles led one to expect statements concerning the acquirement of speech by little children; thus, "Das Kind, Tagebuch eines Vaters" ("The Child, A Father's Diary"), by H. Sem-

mig (second edition, Leipsic, 1876), and the book of B. Perez, already named (p. 239). But inasmuch as for the former of these writers the first cry of the newly-born is a "triumphal song of everlasting life," and for the second author "the glance" is associated with "the magnetic effluvia of the will," I must leave both of these works out of consideration. The second contains many statements concerning the doings and sayings of little children in France; but these can not easily be turned to account.

The same author has issued a new edition, in abridged form, of the "Memoirs," written, according to him, by Dietrich Tiedemann, of a son of Tiedemann two years of age (the biologist, Friedrich Tiedemann, born in 1781). (*Thierri Tiedemann et la science de l'enfant. Mes deux chats. Fragment de psychologie comparée par Bernard Perez.* Paris, 1881, pp. 7–38; Tiedemann, 39–78. "The First Six Weeks of Two Cats.") But it is merely on account of its historical interest that the book is mentioned here, as the scanty (and by no means objective) notes of the diary were made a hundred years ago. The treatises of Pollock and Egger, mentioned in the periodical "Mind" (London, July, 1881, No. 23), I am not acquainted with, and the same is true of the work of Schwarz (mentioned above, p. 224).

Very good general statements concerning the child's acquisition of speech are to be found in Degerando ("L'éducation des sourds-muets de naissance," 1 vol., Paris, 1827, pp. 32–57). He rightly maintains that the child learns to speak through his own observation, without attention from other persons, far more than through systematic instruction; the looks and gestures of the members of the family when talking with one another are especially observed by the child, who avails himself of them in divining the meaning of the words he hears. This

divining, or guessing, plays in fact a chief part in the learning of speech, as I have several times remarked.

New comprehensive diaries concerning the actions of children in the first years of life are urgently to be desired. They should contain nothing but well-established *facts*, no hypotheses, and no repetitions of the statements of others.

Among the very friendly notes that have been sent to me, the following particularly conform to the above requirements. They were most kindly placed at my disposal by the Baroness von Taube, of Esthonia, daughter of the very widely and honorably known Count Keyserling. They relate to her first-born child, and come all of them from the mother herself:

In the first five months I heard from my son, when he cried, all the vowels. The sound *ä* was the first and most frequent. Of the consonants, on the other hand, I heard only *g*, which appeared after seven weeks. When the child was fretful he often cried *gege;* when in good humor he often repeated the syllables *agu, agö, äou, ogö, eia;* then *l* came in, *ül.*

The same sounds in the case of my daughter; but from her I heard, up to her tenth month, in spite of all my observation, no other consonants than *g, b, w,* rarely *l,* and finally *m*-sounds. With my son at the beginning of the seventh month an R-sound appeared —*grr, grrr,* plainly associated with *d* in *dirr dirr.* These sounds were decidedly sounds of discomfort, which expressed dissatisfaction, violent excitement, sleepiness; and they are made even now by the boy at four years of age when, e. g., he is in pain. In the ninth month *dada* and *b, bab-a, bäb-ä* are added. *Agö* also is often said, and *ö* still more often. This *ö* is already a kind of conscious attempt at speaking, for he uses it when he sees anything new, e. g., the dog Caro, which he observes with eager attention, as he does the cat, uttering aloud meanwhile *ö, ö.*

If any one is called, the child calls in a very loud voice, *Ö, oe!* First imitation. (Gestures have been imitated since the eighth month, and the making of grimaces in the child's presence had to be strictly forbidden.) Understanding for what is said is also present,

for when one calls "Caro, Caro," in his hearing, he looks about him as if he were looking for the dog. In the tenth month he often repeats *Pap-ba*, but it has no significance.

If "Backe backe kuchen" ("bake cakes," corresponding to our "pat-a-cake") is said to him, he immediately pats his hands as if preparing bread for baking. In the eleventh month *Pap-ba* is dropped. He now says often *dädädädä*, and, when he is dull or excited (*erregt*) or sleepy, *drin*, *drin*. These *r*-sounds do not occur with my daughter; but since her tenth month she uses *m*-sounds, *mämmä* when she is sleepy or dull. The boy now stretches out his hand and beckons when he sees any one at a distance. At sight of anything new, he no longer says *ö*, but *äda* (twelfth month). He likes to imitate gestures with his arms and mouth; he observes attentively the *movements of the lips of one who is speaking*, sometimes *touching* at the same time the *mouth of the speaker with his finger*.

At ten months the first teeth came. In the eleventh month the child was for the first time taken out into the open air. Now the *g*-sounds again become prominent—*aga*, *ga*, *gugag*. The child begins to creep, but often falls, and while making his toilsome efforts keeps crying out in a very comical manner, *äch*, *äch*, *äch!*

At eleven and a half months a great advance. The child is now much out of doors, and enjoys seeing horses, cows, hens, and ducks. When he sees the hens he says *gog*, *gog*, and even utters some croaking sounds. He can also imitate at once the sound *prrr* when it is pronounced to him. If *papa* is pronounced for him (he has lost this word), he responds regularly *wawa* or *wawawa*. I have only once heard *wauwau* from him. If he hears anybody cough, he immediately gives a little imitative cough in fun (vol. i, p. 288), and this sounds very comical.

He makes much use of *od*, *ädo*, and *äd*, and this also when he sees pictures. When the boy had reached the age of a year, he was weaned; from that time his mental development was very rapid. If any one sings to him gi ga gack, he responds invariably *gack*.

He begins to adapt sounds to objects: imitation of sound is the chief basis of this adaptation. He calls the ducks with *gäk*, *gäk*, and imitates the cock, after a fashion, names the dog *aua* (this he got from his nurse), not only when he sees the animal, but also when he hears him bark. E. g., the child is playing busily with pasteboard boxes; the dog begins to bark outside of the house; the child listens and says *aua*. I roll his little carriage back and forth; he

immediately says *brrr*, pointing to it with his hand; he wants to ride, and I have to put him in (he had heard *burra*, as a name for riding, from his nurse). When he sees a horse, he says *prr* (this has likewise been said for him).

I remark here that the notion that the child thinks out its own language—a notion I have often met with, held by people not well informed in regard to this matter—rests on defective observation. The child has part of his language given to him by others; part is the result of his own sound-imitations—of animals, e. g.—and part rests on mutilations of our language. At the beginning of the thirteenth month he suddenly names all objects and pictures, for some days, *dodo*, *toto*, which takes the place of his former *ŏ;* then he calls them *niana*, which he heard frequently, as it means "nurse" in Russian. Everything now is called *niana: dirr* continues to be the sign of extreme discomfort.

Papba is no more said, ever; on the other hand, *mamma* appears for the first time, but without any significance, still less with any application to the mother.

The word *niana* becomes now the expression of desire, whether of his food or of going to somebody or somewhere. Sometimes, also, under the same circumstances, he cries *mämmä* and *mamma;* the dog is now decidedly called *aua*, the horse *prr*.

14th Month.—He now names also single objects in his picture-book: the dog, *aua*, the cats, *tith* (pronounced as in English), *kiss kiss* having been said for him; horses, *prr*, all birds, *gock* or *gack*. In the house of a neighbor he observes at once the picture, although it hangs high up on the wall, of the emperor driving in a sleigh, and cries *prrr*. Animals that he does not know he calls, whether in the book or the real animals, *aua* or *ua*, e. g. cows.

His nurse, to whom he is much attached, he now calls decidedly *niania*, although he continues to use this word in another sense also. If she is absent for some time, he calls, longingly, *niania, niania*. He sometimes calls me *mamma;* but not quite surely yet. He babbles a good deal to himself; says over all his words, and makes variations in his repertory, e. g., *niana, kanna, danna;* repeats syllables and words, producing also quite strange and unusual sounds, and accumulations of consonants, like *mba, mpta*. As soon as he wakes in the morning he takes up these meaningless language-exercises, and I hear him then going on in an endless babble.

When he does not want a thing, he shakes his head as a sign of

refusal; this no one has taught him. Nodding the head as a sign of assent or affirmation he is not yet acquainted with, and learns it much later.

The nurse speaks with me of Caro; the child attends and says *aua;* he knows what we were talking about. If his grandmother says, "Give the little hand," he at once stretches it out toward her. He understands what is said, and begins consciously to repeat it. His efforts to pronounce the word Grossmama (grandmamma) are comical; in spite of all his pains, he can not get beyond the *gr;* says *Gr-mama*, and finally *Goo-mama*, and makes this utterance every time he sees his grandmother. At this time he learns also from his nurse the word *koppa* as a name for horse, instead of *prr*, *burra*, which, from this time forth, denotes only going in a carriage. *Koppa* is probably a formation from "hoppa koppati," an imitation of the sound of the hoofs.

At the end of the fourteenth month, his stock of words is much enlarged. The child plays much in the open air, sees much, and advances in his development; words and sounds are more and more suited to conceptions. He wakes in the night and says *appa*, which means "Give me some drink." The ball he calls *Ball;* flower, *Bume* (for Blume); cat, *katz* and *kotz* (Katze)—what *kalla*, *kanna*, *kotta* signify we do not know. He imitates the barking of the dog with *auauauau.* He says *teine* for Steine (stones); calls Braten (roast meat) *pâati* and *pâa*, and Brod (bread) the same. If he hits against anything in creeping, he immediately says *ba* (it hurts). If he comes near a dangerous object, and some one says to him, *ba*, he is on his guard at once.

A decided step in advance, at the end of the fourteenth month, is his calling me *Mama.* At sight of me he often cries out, in a loud voice and in a coaxing tone, *ei-mamma!* just as he calls the nurse *ei-niana.* His father he now calls *Papa*, too, but not until now, although this sound, *papba*, made its appearance in the tenth month, after which time it was completely forgotten. His grandmother, as he can not get beyond the *gr*, is now called simply *grrru;* not until later, *Go-mamma.*

15th Month.—He now says *Guten Tag* (good-day), but not always at the right time; also *Guttag.* He likes to see pictures, and calls picture-books *ga* or *gock*, probably because a good many birds are represented in them. He likes to have stories told to him, and to have pictures explained or rather named.

"Hinauf" (up) he calls *üppa*, e. g., when he is to be lifted into his chair. For "unten, hinab" (below, down), he says *patz*. Not long ago he repeated unweariedly *pka*, *pta* (pp. 139, 144), *mba*, *mbwa*.

At this period he begins to raise himself erect, holding on by chairs and such things.

Of horses he is passionately fond; but he begins to use the word *koppa*, as the Chinese do their words, in various meanings. He calls my large gold hair-pins *koppa*. Perhaps in his imagination they represent horses, as do many other objects also with which he plays. Berries he now calls *mamma*. He has a sharp eye for insects, and calls them all *putika*, from the Esthonian *puttukas* (beetle), which he has got from the maid.

All large birds in the picture-book he now calls *papa*, the word being probably derived from *Papagei* (parrot), which he also pronounces *papagoi*. The smaller birds are called *gog* and *gack*.

His image in the glass he calls *titta* (Esthonian designation for child, doll). Does he recognize himself in it (p. 196, *et seq.*)?

Once he heard me in the garden calling some one in a loud voice. He immediately imitated me, and afterward when he was asked "What does mamma do?" he understood the question at once, put out his lips, and made the same sound. He is very uneasy in strange surroundings, in strange places, or among strangers.

My bracelet, too, he now calls *kopita*. *Mann* is a new word. *O-patz* means "playing on the piano," as well as "below, down there." When the piano is played he sings in a hoarse voice, with lips protruded, as well as he can, but does not get the tune. He likes to dance, and always dances in time.

Nocho (noch, yet) is a new word, which he uses much in place of *mehr* (more), e. g., when he wants more food.

He often plays with apples, which for this reason, and very likely because they are round, he calls *Ball*, as he does his rubber ball. Yesterday he had baked apples, mashed, with milk. He recognized the apple at once in this altered form, and said as he ate, *Ball!* At this time he was not yet sixteen months old.

16th Month.—He is often heard to beg, or rather order, *Mamma opatz* (play the piano). If I do not at once obey, he moves his little hands like a piano-player and begs *tatata*, *tatata*, imitating the music. He likes also to hear songs sung, and can already tell some of them, as *Gigagack*, *kucka tralla*. He joins in singing the last of these.

17th Month.—He speaks his own name correctly, and when asked "Where is Adolph?" he points to his breast. As he is always addressed in the third person, i. e., by his name, he does not know any personal pronouns.

The syllable *ei* he often changes to *al;* e. g., he says *Papagal* instead of "Papagei."

He had some grapes given to him for the first time, and he at once called them *mammut* (berries). Being asked, "How do you like them?" he pressed his hand on his heart in an ecstasy of delight that was comical, crying *ach! ach!*

18th Month.—He comprehends and answers questions; e. g., "Where are you going?" *Zu Tuhl* (to the chair). "What is that? *Bett tuddu*, i. e., a bed for sleeping. "Who gave you this?" *Mamma, Pappa.*

He can now say almost any word that is said to him, often mutilating it; but, if pains be taken to repeat it for him, he pronounces it correctly. He often tacks on the syllable *ga*, as if in endearment, *mammaga, pappaga, nianiaga.* The *forming of sentences is also beginning*, for he joins two words together, e. g., *Mamma kommt* (comes), *Papa gut* (good), *Ferd* (for *Pferd*) *halt* (horse stop). He says *wiebacka* for Zwieback (biscuit), *Brati* for Braten (roast meat), Gooss-mama for Grossmama (grandmamma). He pronounces correctly "Onkel Kuno, Suppe, Fuchs, Rabe, Kameel."

When others are conversing in his presence, he often says to himself the words he hears, especially the last words in the sentence. The word "Nein" (no) he uses as a sign of refusal; e. g., "Will you have some roast meat?" *Nein. Ja* (yes), on the other hand, he does not use, but he answers in the affirmative by repeating frequently with vehemence what he wants, e. g., "Do you want some roast?" *Brati, Brati* (i. e., I do want roast).

He gives names to his puppets. He calls them Grandmamma, Grandpapa, Uncle Kuno, Uncle Grünberg, gardener, cook, etc. The puppets are from his Noah's ark.

Now appear his first attempts at drawing. He draws, as he imagines, all kinds of animals: ducks, camels, tigers. He lately made marks, calling out *Torch und noch ein Torch* (a stork and another stork). (Cf. pp. 172, 247.)

The book of birds is his greatest delight. I have to imitate the notes of birds, and he does it after me, showing memory in it. He knows at once stork, woodpecker, pigeon, duck, pelican, siskin, and

swallow. The little verses I sing at the same time amuse him, e. g., "Zeislein, Zeislein, wo ist dein Häuslein?" (Little siskin, where is your little house?); and he retains them when he hears them often. Russian words also are repeated by him.

For the first time I observe the attempt to communicate to others some experience of his own. He had been looking at the picture-book with me, and when he went to the nurse he told her, *Mamma, Bilder, Papagei* (Mamma, pictures, parrot).

19th Month.—From the time he was a year and a half old he has walked alone.

He speaks whole sentences, but without connectives, e. g., *Niana Braten holen* (nurse bring roast); *Caro draussen wauwau* (Caro outside, bow-wow); *Mamma tuddut* (sleeps, inflected correctly); *Decke um* (cover over); *Papa koppa Stadt* (Papa driven to city); *Mamma sitzt tuhl* (Mamma sits chair); *Adolph bei Mama bleiben* (Adolph stay with mamma); *Noch tanzen* (more dance); *Pappa Fuchs machen* (Papa make fox).

Certain words make him nervous. He does not like the refrain of the children's song of the goat. If I say "Darum, darum, meck, meck, meck," he looks at me indignantly and runs off. Sometimes he lays his hand on my mouth or screams loudly for the nurse. He gives up any play he is engaged in as soon as I say "darum, darum." *Pax vobiscum* has the same effect.

The songs amuse him chiefly on account of the words, particularly through the imitations of the sounds of animals.

He knows the songs and asks of his own accord for *Kucku Esaal, Kater putz, Kucku tralla,* but commonly hears only the first stanza, and then wants a different song. Lately, however, he listened very earnestly to the three stanzas of "Möpschen," and when I asked "What now?" he answered *Noch Mops* (more Mops). Playing with his puppets, he hummed to himself, *tu, tu, errsen, tu tu errsen.* I guessed that it was "Du, du liegst mir im Herzen," which he had on the previous day wanted to hear often and had tried to repeat.

20th Month.—Now for the first time *ja* is used for affirmation, chiefly in the form *ja wohl* (yes, indeed, certainly), which he retains. "Do you want this?" *Ja wohl.*

Being asked "Whose feet are these?" he answers correctly, *Mine;* but no personal pronouns appear yet. He often retains a new and difficult word that he has heard only once, e. g., "Chocolade."

To my question, after his grandfather had gone away, "Where is Grandpapa now?" he answers sorrowfully, *verloren* (lost). (Cf. p. 145.)

In his plays he imitates the doings and sayings of adults, puts a kerchief about his head and says, *Adolph go stable, give oats.*

Not long ago, as he said good-night to us, he went also to his image in the glass and kissed it repeatedly, saying, *Adolph, good-night!*

24th Month.—He knows a good many flowers, their names and colors; calls pansies "the dark flowers."

He also caught the air and rhythm of certain songs, e. g., *Kommt a Vogel angeflogen, Du, du, liegst mir im Herzen, machst mir viel Serzen*, and used to sing to himself continually when he was on a walk. Now that he is four years old, on the contrary, he hardly ever sings.

25th Month.—Beetles have a great interest for him. He brings a dead beetle into the parlor, and cries, "Run now!" His astonishment is great that the creature does not run.

If he sees something disagreeable (e. g., he saw the other day an organ-grinder with a monkey), he covers his face with his hands, weeping aloud and crying, *Monkey go away.* So, too, when he sees strangers.

The Latin names of flowers and insects are easily retained by him. They are not taught him, he simply hears them daily.

26th and 27th Months.—Of his childish language he has retained only the term *mammut*, for berries. Milk, which he used to call *mima*, is now called *milch* (cf., pp. 140, 157).

The child's use of the personal pronoun is strange. During my absence an aunt of his took my place, and she addressed him for the *first time* with the word "Du" (thou), and spoke of herself as "I," whereas I always called myself "Mama." The consequence was that the boy for a long time used "thou" as the first person, "I" as the second person, with logical consistency. He hands me bread, saying, *I am hungry*, or, when I am to go with him, *I come too.* Referring to himself, he says, *You want flowers; you will play with Niania.* All other persons are addressed with "I" instead of "you."

He tells his uncle, *There's an awfully pretty gentian in the yard.* He gets the nurse occasionally to repeat the Latin names, because they are difficult for her, and his correction of her is very comical.

28th Month.—He speaks long sentences. *Papa, come drink coffee,*

please do. Papa, I drive (for "you drive") *to town, to Reval, and bring some parrots* (*Bellensittiche*).

He often changes the form of words for fun, e. g., *guten Porgen* (for guten Morgen). On going out, he says, with a knowing air, "Splendid weather, the sun shines so warm." He alters songs also, putting in different expressions: e. g., instead of *Lieber Vogel fliege weiter, nimm a Kuss und a Gruss*, Adolph sings, *Lieber Vogel fliege weiter in die Wolken hinein* (dear bird, fly farther, *into the clouds*, instead of *take a kiss and a greeting*). It is a proof of logical thinking that he asks, at sight of the moon, *The moon is in the sky, has it wings?*

I had been sick; when I was better and was caressing him again, he said, *Mama is well, the dear Jesus has made mama well with sealing-wax.* "With sealing-wax?" I asked, in astonishment. *Yes, from the writing-desk.* He had often seen his toys, when they had been broken, "made well," as he called it, by being stuck together with sealing-wax.

He now asks, *Where is the dear Jesus?* "In heaven." *Can he fly then; has he wings?*

Religious conceptions are difficult to impart to him, even at a much later period: e. g., heaven is too cold for him, his nose would freeze up there, etc.

He now asks questions a good deal in general, especially *What is that called?* e. g., *What are chestnuts called?* "Horse-chestnuts." *What are these pears called?* "Bergamots." He jests: *Nein, Bergapots*, or, *What kind of mots are those?* He will not eat an apple until he has learned what the name of it is.

He would often keep asking, in wanton sport, *What are books called?* or *ducks?* or *soup?*

He uses the words "to-day, to-morrow," and the names of the days of the week, but without understanding their meaning.

Instead of saying "*zu Mittag gehen*" (go to noon-meal), he says, logically, "zu Nachmittag gehen" (go to afternoon-meal).

The child does not know what is true, what is actual. I never can depend on his statements, except, as it appears, when he tells what he has had to eat. If riding is spoken of, e. g., he has a vivid picture of riding in his mind. To-day, when I asked him "Did you see papa ride?" he answered, *Yes, indeed, papa rode away off into the woods.* Yet his father had not gone to ride at all.

In the same way he often denies what he has seen and done. He

comes out of his father's room and I ask, "Well, have you said good-night to papa?" *No.* His father told me afterward that the child had done it.

In the park we see some crested titmice, and I tell the nurse that, in the previous autumn, I saw for the first time Finnish parrots or cross-bills here, but that I have not seen any since. When the child's father asked later, "Well, Adolph, what did you see in the park?" *Crested titmice, with golden crests* (he adds out of his own invention) *and Finnish parrots.* He mixes up what he has heard and seen with what he imagines.

Truth has to be taught to a child. The less this is done, the easier it is to inoculate him with religious notions, i. e., of miraculous revelation; otherwise one must be prepared for many questions that are hard to answer.

29th month.—Sad stories affect him to tears, and he runs away.

Names of animals and plants he remembers often more easily than I do, and informs me. He reasons logically. Lately, when he asked for some foolish thing, I said to him, "Sha'n't I bring the moon for you, too?" *No,* said he, *you can't do that, it is too high up in the clouds.*

30th to 33d months.—He now often calls himself "Adolph," and then speaks of himself in the third person. He frequently confounds "I" and "you," and does not so consistently use the first person for the second, and the reverse. The transition is very gradually taking place to the correct use of the personal pronoun. Instead of *my mamma,* he repeats often, when he is in an affectionate mood, *your mamma, your mamma.*

Some new books are given to him. In the book of beetles there are shown to him the party-colored and the gray, so-called "sad," grave-digger (*necrophorus*). The latter now becomes prominent in his plays. "Why is he called the sad?" I asked the child yesterday. *Ah! because he has no children,* he answered, sorrowfully. Probably he has at some time overheard this sentence, which has no meaning for him, from a grown person. Adult persons' ways of speaking are thus employed without an understanding of them; pure verbal memory.

In the same way, he retains the names, in his new book, of butterflies (few of them German) better than I do, however crabbed and difficult they may be.

This (pure) memory for mere sounds or tones has become less

strong in the now four-year-old boy, who has more to do with ideas and concepts, although his memory in other respects is good.

In the thirty-seventh month he sang, quite correctly, airs he had heard, and he could sing some songs to the piano, if they were frequently repeated with him. His fancy for this soon passed away, and these exercises ceased. On the other hand, he tells stories a great deal and with pleasure. His pronunciation is distinct, the construction of the sentences is mostly correct, apart from errors acquired from his nurse. The confounding of the first and second persons, the "I" and "you," or rather his use of the one for the other, has ceased, and the child designates himself by *I*, others by *thou* and *you*. Men are ordinarily addressed by him with *thou*, as his father and uncle are; women with *you*, as are even his mother and nurse. This continues for a long time. The boy of four years counts objects, with effort, up to six; numbers remain for a long time merely empty words (pp. 165, 172). In the same way, he has, as yet, but small notion of the order of the days of the week, and mixes up the names of them. To-day, to-morrow, yesterday, have gradually become more intelligible to him.

Notwithstanding the aphoristic character of these extracts from a full and detailed diary of observations, I have thought they ought to be given, because they form a valuable supplement to my observations in the nineteenth chapter, and show particularly how far independent thought may be developed, even in the second and third years, while there is, as yet, small knowledge of language. The differences in mental development between this child and mine are no less worthy of notice than are the agreements. Among the latter is the fact, extremely important in a pedagogical point of view, that, the less we teach the child the simple truth from the beginning, so much the easier it is to inoculate him permanently with religious notions, i. e., of "miraculous revelation." Fairy tales, ghost-stories, and the like easily make the childish imagination, of itself very active, hypertrophic, and cloud the judgment concerning actual events. Morals and na-

ture offer such an abundance of facts with which we may connect the teaching of language, that it is better to dispense with legends. Æsop's fables combine the moral and the natural in a manner unsurpassable. My child tells me one of these fables every morning.

B.

NOTES CONCERNING LACKING, DEFECTIVE, AND ARRESTED MENTAL DEVELOPMENT IN THE FIRST YEARS OF LIFE.

THE data we have concerning the behavior of children born, living, without head or without brain, and of microcephalous children, as well as of idiots and cretins more advanced in age, are of great interest, as helping us to a knowledge of the dependence of the first psychical processes upon the development of the brain, especially of the cerebral cortex. Unfortunately, these data are scanty and scattered.

Very important, too, for psychogenesis, are reports concerning the physiological condition and activity of children whose mental development has seemed to be stopped for months, or to be made considerably slower, or to be unusually hastened.

Scanty as are the notes I have met with on this matter, after much search, yet I collect and present some of them, in the hope that they will incite to more abundant and more careful observation in the future than has been made up to this time.

A good many data concerning the behavior of cretin children are to be found in the very painstaking book, "Neue Untersuchungen über den Kretinismus oder die Entartung des Menschen in ihren verschiedenen Graden

und Formen" ("New Investigations concerning Cretinism, or Human Deterioration, in its Various Forms and Degrees"), by Maffei and Rösch (two vols, Erlangen, 1844). But, in order that these data should be of value, the observed anomalies and defects of the cerebral functions ought to be capable of being referred to careful morphological investigations of the cretin brain. As the authors give no results of *post-mortem* examinations, I simply refer to their work here.

I once had the opportunity myself of seeing a hemicephalus, living, who was brought to the clinic of my respected colleague, Prof. B. Schultze, in Jena. The child was of the male sex, and was born on the 1st of July, 1883, at noon, along with a perfectly normal twin sister. The parents are of sound condition. I saw the child for the first time on the 3d of July, at two o'clock. I found all the parts of the body, except the head, like those of ordinary children born at the right time. The head had on it a great red lump like a tumor, and came to an end directly over the eyes, going down abruptly behind; but, even if the tumor were supposed to be covered with skin, there would by no means be the natural arched formation of the cranium of a newly-born child. The face, too, absolutely without forehead, was smaller in comparison than the rest of the body. I found now, in the case of this child, already two days old, a remarkably regular breathing, a very cool skin—in the forenoon a specific warmth of 32° C. had been found—and slight mobility. The eyes remained closed. When I opened them, without violence, the pupil was seen to be immobile. It did not react in the least upon the direct light of the sun on either side. The left eye did not move at all, the right made rare, convulsive, lateral movements. The conjunctiva was very much reddened. The child did not react in the least to pricks

of a dull needle tried on all parts of the body, and reacted only very feebly to pinches; not at all to sound-stimuli, but regularly to stronger, prolonged cutaneous stimuli; in particular, the child moved its arms after a slap on the back, just like normal new-born children, and uttered very harsh, feeble tones when its back was rubbed. When I put my finger in its mouth vigorous sucking movements began, which induced me to offer the bottle—this had not yet been done. Some cubic centimetres of milk were vigorously swallowed, and soon afterward the breast of a nurse was taken. While this was going on I could feel quite distinctly with my finger, under the chin, the movements of swallowing. It was easy to establish the further fact that my finger, which I laid in the hollow of the child's hand, was frequently clasped firmly by the little fingers, which had well-developed nails. Not unfrequently, sometimes without previous contact, sometimes after it, the tip of the tongue, and even a larger part of the tongue, was thrust out between the lips, and once, when I held the child erect, he plainly gave a prolonged yawn. Finally, the fact seemed to me very noteworthy that, after being taken and held erect, sometimes also without any assignable outward occasion, the child inclined its head forward and turned it vigorously both to the right and to the left. When the child had sucked lustily a few times, it opened both eyes about two millimetres wide, and went on with its nursing. An assistant physician saw the child sneeze.

These observations upon a human child, two days old, unquestionably acephalous, i. e., absolutely without cerebrum, but as to the rest of its body not in the least abnormal, prove what I have already advanced (vol. i, p. 203), that the cerebrum takes no part at all in the first movements of the newly-born. In this respect the extremely

rare case of an acephalous child, living for some days, supplies the place of an experiment of vivisection. Unfortunately, the child died so early that I could not carry on further observations and experiments. The report of the *post-mortem* examination will be published by itself.

Every observer of young children knows the great variety in the rapidity of their development, and will agree with me in general that a slow and steady development of the cerebral functions in the first four years, but especially in the first two years, justifies a more favorable prognosis than does a very hasty and unsteady development; but when during that period of time there occurs a complete and prolonged interruption of the mental development, then the danger is always great that the normal course will not be resumed. So much the more instructive, therefore, are the cases in which the children after such a standstill have come back to the normal condition. Four observations of this kind have been published by R. Demme ("19. Bericht über das Jenner'sche Kinderspital in Bern, 1882," S. 31 bis 52). These are of so great interest in their bearing on psychogenesis, and they confirm in so striking a manner some of the propositions laid down by me in this book, that I should like to print them here word for word, especially as the original does not appear to have found a wide circulation; but that would make my book altogether too large. I confine myself, therefore, to this reference, with the request that further cases of partial or total interruption of mental development during the first year of life, with a later progress in it, may be collected and made public.

It is only in rare cases that microcephalous children can be observed, while living, for any considerable length of time continuously. In this respect a case described by Aeby is particularly instructive.

A microcephalous boy was born of healthy parents—he was their first child—about four weeks too soon. His whole body had something of stiffness and awkwardness. The legs were worse off in this respect than the arms; they showed, as they continued to show up to the time of his death, a tendency to become crossed. The boy was never able to stand or walk. He made attempts to seize striking objects, white or party-colored, but never learned actually to hold anything. The play of feature was animated. The dark eyes, shining and rapidly moving, never lingered long upon one and the same object. The child was much inclined to bite, and always bit very sharply. Mentally there was pronounced imbecility. In spite of his four years the boy never got so far as to produce any articulate sounds whatever. Even simple words like "papa" and "mamma" were beyond his ability. His desire for anything was expressed in inarticulate and not specially expressive tones. His sleep was short and light; he often lay whole nights through with open eyes. He seldom shed tears; his discomfort was manifested chiefly by shrill screaming. He died of pulmonary paralysis at the end of the fourth year.

The autopsy showed that the frontal lobes were surprisingly small, and that there was a partial deficiency of the median longitudinal fissure. The fissure did not begin till beyond the crown of the head, in the region of the occiput. The anterior half of the cerebrum consequently lacked the division into lateral hemispheres. It had few convolutions also, and the smoothness of its surface was at once obvious. The *corpus callosum* and the *fornix* were undeveloped. "The gray cortical layer attained in general only about a third of the normal thickness, and was especially weakly represented in the frontal region." The cerebellum not being stunted, seemed, by the side of the greatly shrunken cerebrum, surprisingly large.

In this case the microcephalus of four years behaves, as far as the development of will is concerned, like the normal boy of four months. The latter is, in fact, superior to him in *seizing*, while the former in no way manifests any advantage in a psychical point of view.

Two cases of microcephaly have been described by Fletcher Beach (in the "Transactions of the International Medical Congress," London, 1881, iii, 615–626).

E. R. was, in May, 1875, received into his institution at the age of eleven years. She had at the time of her birth a small head, and had at no time manifested much intelligence. She could not stand or walk, but was able to move her arms and legs. Her sight and hearing were normal. She was quiet and obedient, and sat most of the time in her chair. She paid no attention to her bodily needs. She could not speak and had to be fed with a spoon. After six months she became a little more intelligent, made an attempt to speak, and muttered something indistinctly. She would stretch out her hand when told to give it, and she recognized with a smile her nurse and the physician. Some four months later she would grind her teeth when in a pleasant mood, and would act as if she were shy when spoken to, holding her hand before her eyes. She was fond of her nurse. Thus there was capacity of observation, there were attention, memory, affection, and some power of voluntary movement. She died in January, 1876. Her brain weighed, two days after her death, seven ounces. It is minutely described by the author—but after it had been preserved in alcohol for six years, and it then weighed only two ounces. The author found a number of convolutions not so far developed as in the fœtus of six months, according to Gratiolet, and he is of opinion that the cerebellum was further developed after the cerebrum had ceased to grow, so that there was not an arrest of the development but an irregularity. The cerebral hemispheres were asymmetrical, the frontal lobes, corresponding to the psychical performances in the case, being relatively pretty large, while the posterior portion of the third convolution on the left side, the island of Reil, and the operculum were very small, corresponding to the inability to learn to speak. The author connects the slight mobility with the smallness of the parietal and frontal ascending convolutions.

The other case is that of a girl of six years (E. H.), who came to the institution in January, 1879, and died in

July of the same year. She could walk about, and she had complete control of her limbs. She was cheerful, easy to be amused, and greatly attached to her nurse. She associated with other children, but could not speak a word. Her hearing was good, her habits bad. Although she could pick up objects and play with them, it did not occur to her to feed herself. She could take notice and observe, and could remember certain persons. Her brain weighed, two days after death, 20½ ounces, and was, in many respects, as simple as that of an infant; but, in regard to the convolutions, it was far superior to the brain of a monkey—was superior also to that of E. R. The ascending frontal and parietal convolutions were larger, corresponding to the greater mobility. The third frontal convolution and the island of Reil were small on both sides, corresponding to the alalia. The author is of opinion that the ganglionic cells in this brain lacked processes, so that the inter-central connections did not attain development.

A more accurate description of two brains of microcephali is given by Julius Sander in the "Archiv für Psychiatrie und Nerven-Krankheiten" (i, 299–307; Berlin, 1868), accompanied by good plates. One of these cases is that of which an account is given by Johannes Müller (in the "Medicinische Zeitung des Vereins für Heilkunde in Preussen," 1836, Nr. 2 und 3).

In the full and detailed treatises concerning microcephali by Karl Vogt ("Archiv für Anthropologie," ii, 2, 228) and Von Flesch ("Würzburger Festschrift," ii, 95, 1882) may be found further data in regard to more recent cases.

Many questions of physiological and psychological importance in respect to the capacity of development in cases of imperfectly developed brain are discussed in the "Zeitschrift für das Idioten-Wesen" by W. Schröter (Dresden) and E. Reichelt (Hubertusburg).

But thus far the methods of microscopical investigation of the brain are still so little developed that we can not yet with certainty establish a causal connection, in individual cases, between the deviations of microcephalic brains from the normal brain and the defects of the psychical functions. The number of brains of microcephali that have been examined with reference to this point is very small, although their scientific value, after thorough-going observation of the possessors of them during life, is immense. For microcephalous children of some years of age are a substitute for imaginary, because never practicable, vivisectory experiments, concerning the connection of body and mind.

To conclude these fragments, let me add here some observations concerning a case of rare interest, that of the microcephalous child, Margarethe Becker (born 1869), very well known in Germany. These observations I recorded on the 9th of July, 1877, in Jena, while the child was left free to do what she pleased.

The girl, eight years of age, born, according to the testimony of her father, with the frontal fontanelle (fonticulus anterior) closed and solid, had a smaller head than a child of one year. The notes follow the same order as that of the observations.

Time, 8.15 A. M.—The child yawns. She grasps with animation at some human skulls that she sees on a table near her, and directs her look to charts on the walls. She puts her fingers into her nostrils, brushes her apron with both hands, polishes my watch, which I have offered her and she has seized, holds it to one ear, then to one of her father's ears, draws her mouth into a smile, seems to be pleased by the ticking, holds the watch to her father's other ear, then to her own other ear, laughs, and repeats the experiment several times. Her head is very mobile.

The child now folds a bit of paper that I have given her, rolls it up awkwardly, wrinkling her forehead the while, chews up the paper and laughs aloud. Saliva flows from her mouth almost incessantly. Then the child begins to eat a biscuit, giving some of it, however, to her father and the attendant, putting her biscuit to their lips, and this with accuracy at once, whereas in the former case the watch was held at first near the ear, to the temple, and not till afterward to the ear itself.

The girl is very lively; she strikes about her in a lively manner with her hands, sees charts hanging high on the walls, points to them with her finger, throws her head back upon her neck to see them better, and *moves her fingers in the direction of the lines* of the diagrams. At last weariness seems to come on. The child puts an arm around the neck of her father, sits on his lap, but is more and more restless.

8.50.—Quiet. To appearance, the child has fallen asleep.

8.55.—Awake again. The child *sees* well, *hears* well, *smells* well; obeys some few commands, e. g., she gives her hand. But with this her intellectual accomplishments are exhausted. She does not utter a word.

Kollmann, who saw this microcephalous subject in September, 1877, writes, among other things, of her ("Correspondenzblatt der Deutschengesellschaft für Anthropologie," Nr. 11, S. 132):

"Her gait is tottering, the movements of the head and extremities jerky, not always co-ordinated, hence unsteady, inappropriate and spasmodic; her look is restless, objects are not definitely fixated. The normal functions of her mind are far inferior to those of a child of four years. The eight-year-old Margaret speaks only the word *Mama;* no other articulate sound has been learned by her. She makes known her need of food by plaints, by sounds of

weeping, and by distortion of countenance; she laughs when presented with something to eat or with toys. It is only within the last two years that she has become cleanly; since then her appetite has improved. Her nutrition has gained, in comparison with the first years of life, and with it her comprehension also; she helps her mother set the table, and brings plates and knives, when requested to do so, from the place where they are kept. Further, she shows a tender sympathy with her microcephalous brother; she takes bread from the table, goes to her brother's bedside and feeds him, as he is not of himself capable of putting food into his mouth. She shows a very manifest liking for her relatives and a fear of strangers. When taken into the parlor she gave the most decided evidences of fear; being placed upon the table she hid her head in her father's coat, and did not become quiet until her mother took her in her arms. This awakening of mental activity shows that, notwithstanding the extremely small quantity of brain-substance, there exists a certain degree of intellectual development with advancing years. With the fourth year, in the case of M., independent movements began; up to that time she lay, as her five-year-old brother still lies, immovable in body and limbs, with the exception of slight bendings and stretchings."

Richard Pott, who (1879) likewise observed this microcephalous subject, found that she wandered about aimlessly, restlessly, and nimbly, from corner to corner [as if], groping and seeking; yet objects held before her were only momentarily fixated, scarcely holding her attention; often she did not once grasp at them. "The girl goes alone, without tottering or staggering, but her locomotive movements are absolutely without motive, having no end or aim, frequently changing their direction. Notwithstanding her size, the child gives the impression of the most extreme helplessness." She was fed, but was not indifferent as to food, seeming to prefer sour to sweet. She would come, indeed, when she was called, but seemed

not to understand the words spoken to her; she spoke no word herself, but uttered shrill, inarticulate sounds; she felt shame when she was undressed, hiding her face in her sister's lap. The expression of her countenance was harmless, changeable, manifesting no definite psychical processes.

The statements contradictory to those of Kollmann are probably to be explained by the brevity of the observations.

Virchow ("Correspondenzblatt," S. 135), in his remarks upon this case, says: "I am convinced that every one who observes the microcephalic child will find that psychologically it has nothing whatever of the ape. All the positive faculties and qualities of the ape are wanting here; there is nothing of the psychology of the ape, but only the psychology of an imperfectly developed and deficient little child. Every characteristic is human; every single trait. I had the girl in my room a few months since, for hours together, and occupied myself with her; I never observed anything in her that reminds me even remotely of the psychological conditions of apes. She is a human being, in a low stage of development, but in no way deviating from the nature of humanity."

From these reports it is plain to be seen that for all mental development an hereditary physical growth of the cerebrum is indispensable. If the sensuous impressions experienced anew in each case by each human being, and the original movements, were sufficient without the development of the cerebral convolutions and of the gray cortex, then these microcephalous beings, upon whom the same impressions operated as upon other new-born children, must have had better brains and must have learned more. But the brain, notwithstanding the peripheral impressions received in seeing, hearing, and feeling, could

not grow, and so the rudimentary human child could not learn anything, and could not even form the ideas requisite for articulate voluntary movement, or combine these ideas. Only the motor centers of lower rank could be developed.

In peculiar contrast with these cases of genuine microcephaly stands the exceedingly remarkable case, observed by Dr. Rudolf Krause (Hamburg), of a boy whose brain is not at all morbidly affected or abnormally small, but exhibits decidedly the type of the brain of the ape. The discoverer reported upon it to the Anthropological Society ("Correspondenzblatt a.a. O., S. 132–135) the following facts among others:

"The skull and brain belonged to a boy who was born on the 4th of October, 1869, the last of four children. Paul was scrofulous from his youth. He did not get his teeth until the end of his second year, and they were quite brown in color and were soon lost. According to the statement of Paul's mother, he had several successive sets of teeth. It was not until the fifth year that he learned to walk. He was cleanly from the third year, but not when he felt ill. His appetite was always good up to his last sickness of four weeks. His sleep was habitually undisturbed. He was of a cheerful temperament, and inclined to play; as soon as he heard music he would dance, and sing to the music in rather unmelodious tones. When teased he could be very violent; he would throw anything he could lay his hands on at the head of the offender. He liked the company of others, especially of men. By the time he was four years old he had learned to eat without help. Paul was very supple, was fond of climbing, and had great strength in his arms and hands especially; these had actually a horny appearance, and thus reminded one of the hands of the chimpanzee. He could sit on the ground with his legs wide apart. His gait was uncertain, and he was apt to tumble; he ran with knees bent forward and legs crooked; he was fond of hopping, and seemed particularly ape-like when doing so. The great-toe of each foot stood off at an angle from the foot, and thus

gave the impression of a prehensile toe. I thought at first that this deviation had its origin in the fact that the child, on account of his uncertainty in walking, wanted to get a broader basis of support; but I afterward gave up that opinion, because I have never found an instance of a similar habit in other children with diseased heads, e. g., hydrocephalous children. Paul could speak but little, could say hardly any words except *Papa* and *Mama*, and even these he did not until late learn to pronounce in two syllables; he uttered for the most part only sounds that resembled a grunt. He imitated the barking of a dog by the sound *rrrrrr*. He frequently stamped with feet and hands, clapped his hands together, and ejaculated a sort of grunting sound, just as I have observed in the case of gorillas and chimpanzees.

"Paul was smaller than children of his age; on his right eye he had from his youth a large leucoma; the eyelids had generally a catarrhal affection, and were in a state of suppuration. The head looked sore; the forehead was small. Paul had a strongly marked tendency to imitation. His whole being, his movements, were strikingly ape-like. He was decidedly neglected by his parents, was generally dirty in appearance, and I really think the early death of the child was induced by the slight care taken of him. Paul was taken sick at the beginning of December, 1876, with an acute bronchial catarrh, and died on the 5th of January, 1877, at the age of seven and a quarter years.

"If you look at the cranium and the brain here, which belonged to the child just described, there are lacking in the first place all the characteristics of microcephaly. The cranium possesses a capacity of 1,022 cubic centimetres, and the brain weighs 950 grammes; they do not deviate, therefore, from the normal condition. But let the cranium, where it is laid open by the saw, be observed from within, and we notice an *asymmetry of the two hemispheres of the brain;* the cranium is pushed somewhat forward and to the right. The *partes orbitales* of the frontal bone are higher and more arched than is usual, in consequence of which the *lamina cribrosa* of the ethmoid bone lies deeper, and room is given for the well-known

conformation of the ethmoidal process in the brain. The cerebral convolutions are plainly marked upon the inner surface of the cranium. The facial cranium shows no deviations. There is no prognathism. The formation of the teeth alone is irregular; one pre-molar tooth is lacking above and below in the jaw, and, in fact, there is no place for it. The incisors and the pre-molar teeth are undergoing change.

"The two cerebral hemispheres are asymmetrical; in the region where the parieto-occipital fissure is situated on the left hemisphere, the two hemispheres diverge from each other and form an edge which curves outward and backward, so that the cerebellum remains uncovered. On the lower surface of the frontal lobes there exists a strongly marked ethmoidal prominence. Neither of the fissures of Sylvius is quite closed, the left less so than the right; the operculum is but slightly developed, and the island of Reil lies with its fissures almost entirely uncovered. This conformation reminds us throughout of the brain of the anthropoid apes. The two *sulci centrales sive fissuræ Rolandi* run straight to the border of the hemisphere, less deeply impressed than is normally the case, without forming an angle with each other. Very strongly and deeply impressed *sulci præcentrales* seem to serve as substitutes for them. The *sulcus interparietalis*, which begins farther outward than in the ordinary human being, receives the *sulcus parieto-occipitalis*—a structure in conformity with the typical brain of the ape. The *sulcus occipitalis transversus*, which is generally lightly stamped in man, extends here as a deep fissure across over the occipital lobe, thus producing a so-called simian fissure, and the posterior part of the occipital lobe has the appearance of an operculum. The *fissura calcarina* has its origin directly on the surface of the occipital lobe, does not receive until late the *fissura parieto-occipitalis*, and goes directly, on the right side, into the *fissura hippocampi*. This abnormal structure also is typical for the brain of the ape.

"The *gyrus occipitalis primus* is separated from the upper parietal lobe by the *sulcus parieto-occipitalis*, a formation that, according to Gratiolet, exists in many apes. The *gyrus temporalis superior* is greatly reduced on both

sides, and has an average breadth of only five millimetres; it is the one peculiarity that recalls emphatically the brain of the chimpanzee, which always has this reduced upper temporal convolution.

"We have here, then, a brain that scarcely deviates from the normal brain in volume, that possesses all the convolutions and fissures, seeming, perhaps, richer than the average brain in convolutions, and that is in every respect differentiated; and notwithstanding all this it approximates, in its whole structure, to the simian rather than to the human type. Had the brain been placed before me without my knowing its origin, I should have been perfectly justified in assigning this brain to an anthropoid ape standing somewhat nearer to man than does the chimpanzee."

No second case of this sort has thus far been observed.

C.

REPORTS CONCERNING THE PROCESS OF LEARNING TO SEE, ON THE PART OF PERSONS BORN BLIND, BUT ACQUIRING SIGHT THROUGH SURGICAL TREATMENT. ALSO SOME CRITICAL REMARKS.

I. The Chesselden Case.

The following extracts are taken from the report published by Will. Chesselden in the "Philosophical Transactions for the Months of April, May, and June, 1728" (No. 402, London, pp. 447–450), or the "Philosophical Transactions from 1719 to 1733, abridged by J. Eames and J. Martyn" (vii, 3, pp. 491–493, London, 1734):

"Though we say of the gentleman that he was blind, as we do of all people who have ripe cataracts, yet they are never so blind from that cause but that they can discern day from night, and, for the most part, in a strong light distinguish black, white, and scarlet; but they can

not perceive the shape of anything. . . . And thus it was with this young gentleman, who, though he knew these colors asunder in a good light, yet when he saw them after he was couched, the faint ideas he had of them before were not sufficient for him to know them by afterward, and therefore he did not think them the same which he had known before by those names. . . .

"When he first saw, he was so far from making any judgment about distances, that he thought all objects whatever touched his eyes (as he expressed it) as what he felt did his skin, and thought no objects so agreeable as those which were smooth and regular. He knew not the shape of anything nor any one thing from another, however different in shape or magnitude; but upon being told what things were, whose form he before knew from feeling, he would carefully observe, that he might know them again. But, having too many objects to learn at once, he forgot many of them, and (as he said) at first he learned to know and again forgot a thousand things in a day. Having often forgot which was the cat and which the dog, he was ashamed to ask; but catching the cat (which he knew by feeling), he was observed to look at her steadfastly, and then, setting her down, said, 'So, puss, I shall know you another time.' He was very much surprised that those things which he had liked best did not appear most agreeable to his eyes, expecting those persons would appear most beautiful that he loved most, and such things to be most agreeable to his sight that were so to his taste. We thought he soon knew what pictures represented which were showed to him, but we found afterward we were mistaken, for about two months after he was couched he discovered at once they represented solid bodies, when to that time he considered them only as party-colored planes or surfaces diversified with variety of paint; but even then he was no less surprised, expecting the pictures would feel like the things they represented, and was amazed when he found those parts, which by their light and shadow appeared now round and uneven, felt only flat like the rest, and asked which was the lying sense, feeling or seeing?

"Being shown his father's picture in a locket at his mother's watch and told what it was, he acknowledged a

likeness, but was vastly surprised, asking how it could be that a large face could be expressed in so little room.

"At first he could bear but very little sight, and the things he saw he thought extremely large; but, upon seeing things larger, those first seen he conceived less, never being able to imagine any lines beyond the bounds he saw. The room he was in he said he knew to be but part of the house, yet he could not conceive that the whole house could look bigger. Before he was couched he expected little advantage from seeing, except reading and writing. Blindness, he observed, had this advantage, that he could go anywhere in the dark much better than those who could see, and after he had seen he did not soon lose this quality nor desire a light to go about the house in the night.

"A year after first seeing, being carried upon Epsom Downs and observing a large prospect, he was exceedingly delighted with it and called it a new kind of seeing; and now being lately couched of his other eye, he says that objects at first appeared large to this eye but not so large as they did at first to the other, and, looking upon the same object with both eyes, he thought it looked about twice as large as with the first couched eye only, but not double, that we can anywise discover."

Remark on the First Case.

Although this Chesselden case is the most famous of all, and the most frequently cited, it belongs, nevertheless, to those most inaccurately described. It is, however, not only the first in the order of time, but especially important for the reason that it demonstrates in a striking manner the slow acquirement of space-perception by the eye, and also the acquirement of the first and second dimensions of space (cf. vol. i, p. 57).

II., III. The Ware Cases.

One of these cases is that of a boy, who at the age of seven years recovered his sight which he had lost in the

first half-year of his life. The surgeon who performed the operation, James Ware, writes ("Philosophical Transactions of the Royal Society for 1801," ii, London, 1801, pp. 382–396):

"The young W. appeared to be a healthy, perfect child; his eyes in particular were large and rather prominent. About the end of his first year, a number of persons passing in procession near his father's house, accompanied with music and flags, the child was taken to see them; but, instead of looking at the procession, it was observed that, though he was evidently much pleased with the music, his eyes were never directed to the place from whence the sound came. His mother, alarmed by this discovery, held silver spoons and other glaring objects before him at different distances, and she was soon convinced that he was unable to perceive any of them. A surgeon was consulted, who, on examining the eyes, pronounced that there was a complete cataract in each. All thoughts of assisting his sight were (for the present) relinquished. As soon as he could speak it was observed that when an object was held close to his eyes he was able to distinguish its color if strongly marked, but on no occasion did he ever notice its outline or figure. I performed the operation on the left eye on the 29th of December, 1800. The eye was immediately bound up, and no inquiries made on that day with regard to his sight. On the 30th I found that he had experienced a slight sickness on the preceding evening. On the 31st, as soon as I entered his chamber, the mother with much joy informed me that her child could see. About an hour before my visit he was standing near the fire, with a handkerchief tied loosely over his eyes, when he told her that under the handkerchief, which had slipped upward, he could distinguish the table by the side of which she was sitting. It was about a yard and a half from him, and he observed that it was covered with a green cloth (which was really the case), and that it was a little farther off than he was able to reach. . . . Desirous to ascertain whether he was able to distinguish objects, I held a letter before him at the distance of about twelve inches, when he told me, after a short hesitation, that it

was a piece of paper; that it was square, which he knew by its corners; and that it was longer in one direction than it was in the other. On being desired to point to the corners, he did it with great precision and readily carried his finger in the line of its longest diameter. I then showed him a small oblong bandbox covered with red leather, which he said was red and square, and pointed at once to its four corners. After this I placed before him an oval silver box, which he said had a shining appearance, and presently afterward that it was round, because it had not corners. A white stone mug he first called a white basin, but soon after, recollecting himself, said it was a mug because it had a handle. I held the objects at different distances from his eye and inquired very particularly if he was sensible of any difference in their situation, which he always said he was, informing me on every change whether they were brought nearer to or carried farther from him. I again inquired, both of his mother and himself, whether he had ever before this time distinguished by sight any sort of object, and I was assured by both that he never had on any occasion, and that when he wished to discover colors, which he could only do when they were very strong, he had always been obliged to hold the colored object close to his eye and a little on one side to avoid the projection of the nose. No further experiments were made on that day. On the 1st of January I found that he felt no uneasiness on the approach of light. I showed him a table-knife, which at first he called a spoon, but soon rectified the mistake, giving it the right name and distinguishing the blade from the handle by pointing to each as he was desired. He called a yellow pocket-book by its name, taking notice of the silver lock in the cover. I held my hand before him, which he knew, but could not at first tell the number of my fingers nor distinguish one of them from another. I then held up his own hand and desired him to remark the difference between his thumb and his fingers, after which he readily pointed out the distinctions in mine also. Dark-colored and smooth objects were more agreeable to him than those which were bright and rough. On the 3d of January he saw from the drawing-room window a dancing bear in the

street and distinguished a number of boys that were standing round him, noticing particularly a bundle of clothes which one of them had on his head. On the same evening I placed him before a looking-glass and held up his hand. After a little time he smiled and said he saw the shadow of his hand as well as that of his head. He could not then distinguish his features; but on the following day, his mother having again placed him before the glass, he pointed to his eyes, nose, and mouth. The young W., a remarkably intelligent boy (of seven years), gave the most direct and satisfactory answers to every question that was put to him, and, though not born blind, certainly had not any recollection of having ever seen. The right eye was operated upon a month after the left, but without the least success."

In regard to the other case, Ware writes: "In the instance of a young gentleman from Ireland, fourteen years old, from each of whose eyes I extracted a cataract in the year 1794, and who, before the operation, assured me, as did his friends, that he had never seen the figure of any object, I was astonished by the facility with which, on the first experiment, he took hold of my hand at different distances, mentioning whether it was brought nearer to or carried farther from him, and conveying his hand to mine in a circular direction, that we [Ware and another physician] might be the better satisfied of the accuracy with which he did it." In this case, as in others of like nature, Ware could not, "although the patients had certainly been blind from early infancy," satisfy himself "that they had not, before this period, enjoyed a sufficient degree of sight to impress the image of visible objects on their minds, and to give them ideas which could not afterward be entirely obliterated."

Ware found, moreover, that, in the case of two children between seven and eight years of age, both blind from birth, and on whom no operation had been performed, the knowledge of colors, limited as it was, was sufficient to enable them to tell whether colored objects were brought nearer to or carried farther from them; for

instance, whether they were at the distance of two inches or four inches from their eyes; and he himself observes that they were not, in strictness of speech, blind, though they were deprived of all useful sight.

Remarks on the Second and Third Cases.

It is a surprising thing, in the account of the former case, that nothing whatever is said of the behavior of the patient on the first and on the fourth day after the operation. We must assume that he passed the first day wholly with his eyes bandaged. Further, the boy pointed out four corners of a box, while the box had eight; yet no inference can be drawn from this, for possibly only one side of the box was shown to him. The most remarkable thing is the statement of the patient that he saw the *shadow* of his hand in the glass. This circumstance, and the astonishing certainty, at the very first attempts to estimate space-relations, in the discrimination of round and angular, and in the observation that the table was somewhat farther from him than he could reach, show what influence the mere ability to perceive colors has upon vision in space. Before the operation, W. distinguished only striking colors from one another; but he could perceive nearness and distance of colored objects, within narrow limits, by the great differences in the luminous intensity of the colors. He distinguished with certainty dimness from brightness. Accordingly, when he noticed a decrease in the brightness of a color, he inferred the distance of the colored object from the eye, regulating his judgment also by touch. Thus the boy had, before the operation, some perception of space with the eye, and it is not much to be wondered at, considering his uncommon intelligence, that he, soon after the operation (probably attempts at seeing were secretly made by the patient on the first day) learned to judge

pretty surely of space-relations—much more surely than a person born blind learns to judge in so short a time. Besides, it is not to be forgotten that, while it is true that the cataract had become completely developed at the end of the first year of life, there is no proof that the child was unable to see during the first months. At that time images, as in the second case, may have unconsciously impressed themselves, with which, at a later period, more accurate space-ideas may have been associated, through the sense of touch, than is the case with persons born completely blind. Ware concludes, from his observations—

1. "When children are born blind, in consequence of having cataracts in their eyes, they are never so totally deprived of sight as not to be able to distinguish colors; and, though they can not see the figure of an object, nor even its color, unless it be placed within a very short distance, they nevertheless can tell whether, when within this distance, it be brought nearer to or carried farther from them.

2. "In consequence of this power, whilst in a state of comparative blindness, children who have their cataracts removed are enabled immediately on the acquisition of sight to form some judgment of the distance, and even of the outline, of those strongly defined objects with the color of which they were previously acquainted."

Both these conclusions are simply matter of fact. It only needs explanation how the distance and outlines of objects can be known after the operation *in consequence of* the ability described in the first proposition. That distance is actually estimated at once in consequence of this power, is clear; not so with the outlines. How can round and angular be distinguished, when only colors and gross differences of intensity and saturation are perceived? Ware gives no solution of the difficulty, but thinks that, because the colors appeared more intense, the previously

imperfect ideas concerning distances might be improved and extended, so that they would even give a knowledge of the boundary-lines and of the form of those things with the color of which the patients were previously acquainted. But this improvement of the ideas concerning distance can not lead directly to discrimination of the limits of objects, and is itself hypothetical, inasmuch as we might expect, *immediately* after the operation, on account of the enormous difference in the luminous intensity, an uncertainty in the judgment. But such uncertainty appeared only in a slight degree in both the cases, a thing possible only because there had already been sufficient experiences with the eye. But these experiences, as is frequently stated, were absolutely lacking in regard to the limits and the form of objects. Here another thing comes in to help. Evidently, an eye that distinguishes only colors sees these colors always only as limited; even if it saw only a single color that occupied the whole field of vision, the field would still be a limited one. But the colored field may be small or large, and this difference may be noticed before the operation. If the object—one of vivid coloring—is long and narrow, the patient, even before the operation, will see it otherwise than if it is, with the same coloring, short and broad. And suppose he merely observes that not the whole field of vision is colored. If the whole field is colored, there is, of course, an entire lack of angles; on the other hand, if the whole field of vision is not filled by the colored object, then it is—however faintly—divided, and the lines of division, i. e., the indistinct boundary-lines of the objects whose color is perceived, may be either like the natural limits of the entire field of vision, i. e., "round," or unlike them, i. e., "angular." If, now, the obstacle is suddenly removed, the patient (even if he did not before the operation distinguish angular and round by the eye)

must yet perceive which of the objects before him resemble in contour the previous field of vision, i. e., are round, and which do not; for the round contour of his field of vision is familiar to him. But W. had learned, through the sense of touch, that what is not round is angular. He would, therefore, even if he could perceive colors when the whole field of vision was filled—a matter on which we have no information—be able to guess the outlines of some objects soon after the operation, merely on the ground of his experiences before it. It was guess-work every time, as appears from the confounding of knife and spoon, mug and basin. The boy must have thought, "How would it be if I felt of it?" and, as he had before the operation frequently observed that whatever had the same contour as his field of vision, or a contour similar to that, was round, he could, after the operation, distinguish round and not round—a thing which a person born blind, on the other hand, and knowing nothing of his field of vision, because he has never had any, can never do.

On the whole, the two Ware cases are by no means so important as the Franz (see below) and Chesselden cases, because the boy, W., had ample opportunity up to his seventh year for learning to distinguish different colors according to their quality and luminous intensity; because he must have known the limits of his field of vision, and could in any case, by means of touch, correct and relatively confirm his very frequent attempts to guess at forms and distances by the eye. Finally, it is not known whether he became blind before or immediately after his birth, or, as is most probable, not till some months after birth. The same is true of the second case.

IV, V. The Home Cases.

Everard Home makes the following statement in the "Philosophical Transactions of the Royal Society," London, 1807, i, pp. 83–87, 91:

"1. William Stiff, twelve years of age, had cataracts in his eyes, which, according to the account of his mother, existed at the time of birth. From earliest infancy he never stretched out his hand to catch at anything, nor were his eyes directed to objects placed before him, but rolled about in a very unusual manner. The eyes were not examined till he was six months old, and at that time the cataracts were as distinct as when he was received into the hospital. He could at that time (July 17, 1806) distinguish light from darkness, and the light of the sun from that of a fire or candle; he said it was redder and more pleasant to look at, but lightning made a still stronger impression on his eyes. All these different lights he called red. The sun appeared to him the size of his hat. The candle-flame was larger than his finger and smaller than his arm. When he looked at the sun, he said it appeared to touch his eye. When a lighted candle was placed before him, both his eyes were directed toward it, and moved together. When it was at any nearer distance than twelve inches, he said it touched his eyes. When moved farther off he said it did not touch them, and at twenty-two inches it became invisible.

"On the 21st of July the operation of extracting the crystalline lens was performed on the left eye. Light became very distressing to his eye. After allowing the eyelids to remain closed for a few minutes, and then opening them, the pupil appeared clear, but he could not bear exposure to light. On my asking him what he had seen, he said, 'Your head, which seemed to touch my eye,' but he could not tell its shape. On the 22d the light was less offensive. He said he saw my head, which touched his eye. On the 23d the eye was less inflamed, and he could bear a weak light. He said he could see several gentlemen round him, but could not describe their figure. My face, while I was looking at his eye, he said was round and red.

From the 25th of July to the 1st of August there was inflammation. On the 4th of August an attempt was made to ascertain the powers of vision; it became necessary to shade the glare of light by hanging a white cloth before the window. The least exertion fatigued the eye, and the cicatrix on the cornea, to which the iris had become attached, drew it down so as considerably to diminish the pupil. The attempt had therefore to be postponed.

"On the 16th of September the right eye was couched. The light was so distressing to his eye that the lids were closed as soon as it was over. The eyes were not examined with respect to their vision till the 13th of October; the boy remained quiet in the hospital. On this day he could discern a white, red, or yellow color, particularly when bright and shining. The sun and other objects did not now seem to touch his eyes as before, they appeared to be at a short distance from him. The right eye had the most distinct vision, but in both it was imperfect. The distance at which he saw best was five inches. When the object was of a bright color, and illuminated by a strong light, he could make out that it was flat and broad; and when one corner of a square substance was pointed out to him, he saw it, and could find out the other, which was at the end of the same side, but could not do this under less favorable circumstances. When the four corners of a white card were pointed out, and he had examined them, he seemed to know them; but when the opposite surface of the same card, which was yellow, was placed before him, he could not tell whether it had corners or not, so that he had not acquired any correct knowledge of them, since he could not apply it to the next colored surface, whose form was exactly the same with that, the outline of which the eye had just been taught to trace. . . .

"2. John Salter, seven years of age, was admitted into St. George's Hospital on the 1st of October, 1806, with cataracts in both eyes, which, according to the accounts of his relations, had existed from his birth. The pupils contracted considerably when a lighted candle was placed before him, and dilated as soon as it was withdrawn. He was capable of distinguishing colors with tolerable accuracy, particularly the more bright and vivid ones. On the

6th of October the left eye was couched. The eye was allowed ten minutes to recover itself; a round piece of card, of a yellow color, one inch in diameter, was then placed about six inches from it. He said immediately that it was yellow, and, on being asked its shape, said, 'Let me touch it, and I will tell you.' Being told that he must not touch it, after looking for some time, he said it was round. A square, blue card, nearly the same size, being put before him, he said it was blue and round. A triangular piece he also called round. The different colors of the objects placed before him he instantly decided on with great correctness, but had no idea of their form. He saw best at a distance of six or seven inches. He was asked whether the object seemed to touch his eye; he said, 'No,' but when desired to say at what distance it was, he could not tell. The eye was covered, and he was put to bed and told to keep himself quiet; but upon the house-surgeon going to him half an hour afterward, his eye was found uncovered, and he was looking at his bed-curtains, which were close drawn. The bandage was replaced, but so delighted was the boy with seeing, that he again immediately removed it. The house-surgeon could not enforce his instructions, and repeated the experiment about two hours after the operation. Upon being shown a square, and asked if he could find any corners to it, the boy was very desirous of touching it. This being refused, he examined it for some time, and said at last that he had found a corner, and then readily counted the four corners of the square; and afterward, when a triangle was shown him, he counted the corners in the same way; but in doing so his eye went along the edge from corner to corner, naming them as he went along. Next day he told me he had seen 'the soldiers with their fifes and pretty things.' The guards in the morning had marched past the hospital with their band; on hearing the music, he had got out of bed and gone to the window to look at them. Seeing the bright barrels of muskets, he must in his mind have connected them with the sounds which he heard, and mistaken them for musical instruments. Twenty-four hours after the operation the pupil of the eye was clear. A pair of scissors was shown him, and he said it was a knife. On

being told he was wrong, he could not make them out; but the moment he touched them he said they were scissors, and seemed delighted with the discovery.

"From this time he was constantly improving himself by looking at, and examining with his hands, everything within his reach, but he frequently forgot what he had learned. On the 10th I saw him again. He went to the window and called out, 'What is that moving?' I asked him what he thought it was. He said: 'A dog drawing a wheelbarrow. There is one, two, three dogs drawing another. How very pretty!' These proved to be carts and horses on the road, which he saw from a two-pair-of-stairs window.

"On the 19th the different colored pieces of card were separately placed before his eye, and so little had he gained in thirteen days that he could not, without counting their corners one by one, tell their shape. This he did with great facility, running his eye quickly along the outline, so that it was evident he was still learning, just as a child learns to read. He had got so far as to know the angles, when they were placed before him, and to count the number belonging to any one object. The reason of his making so slow a progress was, that these figures had never been subjected to examination by touch, and were unlike anything he had been accustomed to see. He had got so much the habit of assisting his eyes with his hands, that nothing but holding them could keep them from the object.

"On the 26th the experiments were again repeated on the couched eye. It was now found that the boy, on looking at any one of the cards in a good light, could tell the form nearly as readily as the color."

From these two instructive cases Home concludes:

"That, where the eye, before the cataract is removed, has only been capable of discerning light, without being able to distinguish colors, objects after its removal will seem to touch the eye, and there will be no knowledge of their outline, which confirms the observations made by Chesselden.

"That where the eye has previously distinguished colors, there must also be an imperfect knowledge of dis-

tances, but not of outline, which, however, will be very soon acquired, as happened in Ware's cases. This is proved by the history of the first boy, who, before the operation had no knowledge of colors or distances, but after it, when his eye had only arrived at the same state that the second boy's was in before the operation, he had learned that the objects were at a distance and of different colors.

"That when a child has acquired a new sense, nothing but great pain or absolute coercion will prevent him from making use of it."

VI. The Wardrop Case.

James Wardrop reports ("Philosophical Transactions of the Royal Society for 1826," iii, 529–540, London, 1826):

"A girl who was observed, during the first months of her infancy, to have something peculiar in the appearance of her eyes and an unusual groping manner which made her parents suspect that she had defective vision, had an operation performed on both eyes at the age of about six months The right eye was entirely destroyed in consequence. The left eye was preserved, but the child could only distinguish a very light from a very dark room without having the power to perceive even the situation of the window through which the light entered, though in sunshine or in bright moonlight she knew the direction from which the light emanated. In this case no light could reach the retina except such rays as could pass through the substance of the iris. Until her forty-sixth year the patient could not perceive objects and had no notion of colors. On the 26th of January I introduced a very small needle through the cornea and the center of the iris; but I could not destroy any of the adhesions which had shut up the pupillar opening. After this operation she said she could distinguish more light, but she could perceive neither forms nor colors. On the 8th of February the iris (a portion of it) was divided. The light became offensive to her. She complained of its brightness, and was frequently observed trying to see her hands; but

it was evident that her vision was very imperfect, for, although there was an incision made in the iris, some opaque matter lay behind the opening, which must have greatly obstructed the entrance of light.

"On the 17th of February a third operation. The opening was enlarged and the opaque matter removed. The operation being performed at my house, she returned home in a carriage, with her eye covered only with a loose piece of silk, and the first thing she noticed was a hackney-coach passing, when she exclaimed, 'What is that large thing that has passed by us?' In the course of the evening she requested her brother to show her his watch, concerning which she expressed much curiosity, and she looked at it a considerable time, holding it close to her eye. She was asked what she saw, and she said there was a dark and a bright side; she pointed to the hour of twelve, and smiled. Her brother asked her if she saw anything more. She replied, 'Yes,' and pointed to the hour of six and to the hands of the watch. She then looked at the chain and seals, and observed that one of the seals was bright, which was the case. The following day I asked her to look again at the watch, which she refused to do, saying that the light was offensive to her eye and that she felt very stupid, meaning that she was much confused by the visible world thus for the first time opened to her.

"On the third day she observed the doors on the opposite side of the street and asked if they were red, but they were, in fact, of an oak-color. In the evening she looked at her brother's face and said that she saw his nose. He asked her to touch it, which she did. He then slipped a handkerchief over his face and asked her to look again, when she playfully pulled it off and asked, 'What is that?'

"On the sixth day she told us that she saw better than she had done on any preceding day; 'but I can not tell what I do see. I am quite stupid.' She felt disappointed in not having the power of distinguishing at once by her eye objects which she could so readily distinguish from one another by feeling them.

"On the seventh day she observed that the mistress of the house was tall. She asked what the color of her gown

was, to which she was answered that it was blue. 'So is that thing on your head,' she then observed, which was the case; 'and your handkerchief, that is a different color,' which was also correct. She added, 'I see you pretty well, I think.' The teacups and saucers underwent an examination. 'What are they like?' her brother asked her. 'I don't know,' she replied, 'they look very queer to me, but I can tell what they are in a minute when I touch them.' She distinguished an orange, but could form no notion of what it was till she touched it. She seemed now to have become more cheerful, and she was very sanguine that she would find her newly acquired faculty of more use to her when she returned home, where everything was familiar to her.

"On the eighth day she asked her brother 'what he was helping himself to?' and when she was told it was a glass of port wine, she replied, 'Port wine is dark, and looks to me very ugly.' She observed, when candles were brought into the room, her brother's face in the mirror as well as that of a lady who was present; she also walked for the first time without assistance from her chair to a sofa which was on the opposite side of the room and back again to the chair. When at tea she took notice of the tray, observed the shining of the japan-work, and asked 'what the color was round the edge?' she was told that it was yellow, upon which she remarked, 'I will know that again.'

"On the ninth day she came down-stairs to breakfast in great spirits. She said to her brother, 'I see you very well to-day,' and came up to him and shook hands. She also observed a ticket on a window of a house on the opposite side of the street ('a lodging to let'), and her brother, to convince himself of her seeing it, took her to the window three several times, and to his surprise and gratification she pointed it out to him distinctly on each trial.

"She spent a great part of the eleventh day looking out of the window, and spoke very little.

"On the twelfth day she went to walk with her brother. The clear blue sky first attracted her notice, and she said, 'It is the prettiest thing I have ever seen

yet, and equally pretty every time I turn round and look at it.' She distinguished the street from the foot-pavement distinctly, and stepped from one to the other like a person accustomed to the use of her eyes. Her great curiosity, and the manner in which she stared at the variety of objects and pointed to them, exciting the observation of many by-standers, her brother soon conducted her home, much against her will.

"On the evening of the thirteenth day she observed that there was a different tea-tray, and that it was not a pretty one, but had a dark border, which was a correct description. Her brother asked her to look in the mirror and tell him if she saw his face in it, to which she answered, evidently disconcerted: 'I see my own; let me go away.'

"On the fourteenth day she drove in a carriage four miles, and noticed the trees, and likewise the river Thames as she crossed Vauxhall Bridge. At this time it was bright sunshine, and she said something dazzled her when she looked on the water.

"On the fifteenth day she walked to a chapel. The people passing on the pavement startled her, and once when a gentleman was going past her who had a white waistcoat and a blue coat with yellow buttons, which the sunshine brought full in her view, she started so as to draw her brother, who was walking with her, off the pavement. She distinguished the clergyman moving his hands in the pulpit, and observed that he held something in them. This was a white handkerchief.

"On the sixteenth day she went in a coach through the town, and appeared much entertained with the bustle in the streets. On asking her how she saw on that day, she answered: 'I see a great deal, if I could only tell what I do see; but surely I am very stupid.'

"On the seventeenth day, when her brother asked her how she was, she replied: 'I am well, and see better; but don't tease me with too many questions till I have learned a little better how to make use of my eye. All that I can say is, that I am sure, from what I do see, a great change has taken place, but I can not describe what I feel.'

"On the eighteenth day, when pieces of paper one inch

and a half square, differently colored, were presented to her, she not only distinguished them at once from one another, but gave a decided preference to some colors, liking yellow most, and then pale pink. When desirous of examining an object, she had considerable difficulty in directing her eye to it and finding out its position, moving her hand as well as her eye in various directions, as a person when blindfolded or in the dark gropes with his hands for what he wishes to touch. She also distinguished a large from a small object when they were both held up before her for comparison. She said she saw different forms in various objects which were shown to her. On asking what she meant by different forms, such as long, round, and square, and desiring her to draw with her finger these forms on her other hand, and then presenting to her eye the respective forms, she pointed to them exactly; she not only distinguished small from large objects, but knew what was meant by above and below. A figure, drawn with ink, was placed before her eye, having one end broad and the other narrow, and she saw the positions as they really were, and not inverted.

"She could also perceive motions, for, when a glass of water was placed on the table before her, on approaching her hand near it, it was moved quickly to a greater distance, upon which she immediately said: 'You move it; you take it away.'

"She seemed to have the greatest difficulty in finding out the distance of any object; for, when an object was held close to her eye, she would search for it by stretching her hand far beyond its position, while on other occasions she groped close to her own face for a thing far removed from her.

"She learned with facility the names of the different colors, and two days after the colored papers had been shown to her, on coming into a room the color of which was crimson, she observed that it was red. She also observed some pictures hanging on the red wall of the room in which she was sitting, distinguishing several small figures in them, but not knowing what they represented, and admiring the gilt frames. On the same day she walked round a pond, and was pleased with the glistening of the

sun's rays on the water, as well as with the blue sky and green shrubs, the colors of which she named correctly.

"She had as yet acquired, by the use of her sight, but very little knowledge of any forms, and was unable to apply the information gained by this new sense, and to compare it with what she had been accustomed to acquire by her sense of touch. When, therefore, a silver pencil-case and a large key were given her to examine with her hands, she discriminated and knew each distinctly; but when they were placed on the table, side by side, though she distinguished each with her eye, yet she could not tell which was the pencil-case and which was the key.

"On the twenty-fifth day after the operation she drove in a carriage for an hour in the Regent's Park, and asked more questions, on her way there, than usual, about the objects surrounding her, such as, 'What is that?' 'It is a soldier,' she was answered. 'And that? See, see!' These were candles of various colors in a tallow-chandler's window. 'Who is that that has passed us just now?' It was a person on horseback. 'But what is that on the pavement, red?' It was some ladies who wore red shawls. On going into the park she was asked if she could guess what any of the objects were. 'Oh, yes,' she replied, 'there is the sky; that is the grass; yonder is water, and two white things,' which were two swans.

"When she left London, forty-two days after the operation, she had acquired a pretty accurate notion of colors and their different shades and names. She had not yet acquired anything like an accurate knowledge of distance or of forms, and, up to this period, she continued to be very much confused with every new object at which she looked. Neither was she yet able, without considerable difficulty and numerous fruitless trials, to direct her eye to an object; so that, when she attempted to look at anything, she turned her head in various directions, until her eye caught the object of which it was in search."

Remarks on the Sixth Case.

This case has been adduced as a proof that the sense of sight is sufficient, without aid from the sense of touch, to

perceive whether an object is brought nearer the eye or carried farther from it. But John Stuart Mill rightly observes, in opposition to this ("Dissertations and Discussions," ii, 113; London, 1859), that the observation we are concerned with was not made "till the eighteenth day after the operation, by which time a middle-aged woman might well have acquired the experience necessary for distinguishing so simple a phenomenon." Besides, she was very uncertain in her judgment of distances, and, in her attempts to seize with the hand new and distant objects, she frequently acted exactly like an infant.

VII. The Franz Case.

J. C. A. Franz, of Leipsic, communicates the following to the "Philosophical Transactions of the Royal Society" (by Sir Benjamin C. Brodie), (London, 1841; i, pp. 59–69):

"F. J. is the son of a physician. He is endowed with an excellent understanding, quick power of conception, and retentive memory. At his birth, both eyes were found to be turned inward to such an extent that a portion of the cornea was hidden by the inner canthus, and in both pupils there was a yellowish-white discoloration. That the strabismus and cataract of both eyes in this case were congenital is evident from the testimony both of the parents and of the nurse. The latter held a light before the eyes of the child when he was a few months old, of which he took no notice. I ascertained also from her that the eyeballs did not move hither and thither, but were always turned inward, and that but rarely either the one or the other was moved from the internal canthus.

"Toward the end of the second year, as was stated to me, the operation of keratonyxis was performed on the right eye, upon which a severe iritis ensued, terminating in atrophy of the eyeball. Within the next four years two similar operations were performed on the left eye without success. The color of the opacity became, however, of a

clearer white, and the patient acquired a certain sensation of light, which he did not seem to have had before the operation.

"At the end of June, 1840, the patient, being then seventeen years of age, was brought to me. I found the condition of things as follows: Both eyes were so much inverted that nearly one half the cornea was hidden. The left eye he could move voluntarily outward, but not without exertion; it returned immediately inward when the influence of the will had ceased. The left eyeball was of the natural size and elasticity. The patient had not the slightest perception of light with the right eye; the stimulus of light had no effect on the pupil. The pupil of the left eye, which was not round, but drawn angularly downward and inward, did not alter in dimension with the movements of the eye nor from the stimulus of light. On examining the eye by looking straight into it through the pupil, the anterior wall of the capsule appeared opaque in its whole extent, and of a color and luster like mother-of-pearl. On looking from the temporal side in an oblique direction into the pupil, there was visible in the anterior wall of the capsule a very small perpendicular cleft of about one line and a quarter in length.

"This cleft was situated so far from the center of the pupil that it was entirely covered by the iris. With this eye the patient had a perception of light, and was even capable of perceiving colors of an intense and decided tone. He believed himself, moreover, able to perceive about one third of a square inch of any bright object, if held at the distance of half an inch or an inch from the eye, and obliquely in such a direction as to reflect the light strongly toward the pupil. But this, I am convinced, was a mere delusion, for all rays of light falling in the direction of the optic axis must have been intercepted and reflected by the opaque capsule. By these rays, therefore, a perception of light, indeed, might be conveyed, but certainly no perception of objects. On the other hand, it seems probable that the lateral cleft in the capsule permitted rays of light to pass into the interior of the eye. But as this small aperture was situated entirely behind the iris, those rays only would have permeated which came

in a very oblique direction from the temporal side. Admitting, then, these rays of light to pass through the cleft, still on account of their obliquity they could produce but a very imperfect image, because they impinged upon an unfavorable portion of the retina. Moreover, I satisfied myself by experiments, that the patient could not in the least discern objects by sight. My experiments led me to the conclusion that his belief that he really saw objects resulted solely from his imagination combined with his power of reasoning. In feeling an object and bringing it in contact with the eyelids and the cheek, an idea of the object was produced, which was judged of and corrected according to the experience he had gained by constant practice.

" The patient's sense of touch had attained an extraordinary degree of perfection. In order to examine an object minutely he conveyed it to his lips.

" On the 10th of July, 1840, I performed an operation on the left eye. The light was so painful to him that I could not try any experiments immediately after the operation. Both eyes were closed with narrow strips of court-plaster, and treated with iced water for forty-eight hours. The patient suffered from *muscæ volitantes*, and could not bear even a mild degree of light falling on the closed lids. After the lapse of a few weeks, the *muscæ volitantes* were greatly mitigated, and the intolerance of light ceased.

" On opening the eye for the first time on the third day after the operation, I asked the patient what he could see; he answered that he saw an extensive field of light, in which everything appeared dull, confused, and in motion. He could not distinguish objects. The pain produced by the light forced him to close the eye immediately.

" Two days afterward the eye, which had been kept closed by means of court-plaster, was again opened. He now described what he saw as a number of opaque watery spheres, which moved with the movements of the eye, but when the eye was at rest remained stationary, and then partly covered each other. Two days after this the eye was again opened. The same phenomena were again observed, but the spheres were less opaque and somewhat

transparent; their movements more steady; they appeared to cover each other more than before. He was now for the first time able, as he said, to look through the spheres, and to perceive a difference, but merely a difference, in the surrounding objects. When he directed his eye steadily toward an object, the visual impression produced by the object was painful and very imperfect, because the eye, on account of its intolerance of light, could not be kept open long enough for the formation of the idea as derived from visual sensation. The appearance of spheres diminished daily; they became smaller, clearer, and more pellucid, allowed objects to be seen more distinctly, and disappeared entirely after two weeks. The *muscæ volitantes*, which had the form of black, immovable, and horizontal stripes, appeared, every time the eye was opened, in a direction upward and inward. When the eye was closed he observed, especially in the evening, in an outward and upward direction, an appearance of dark blue, violet, and red colors; these colors became gradually less intense, were shaded into bright orange, yellow, and green, which latter colors alone eventually remained, and in the course of five weeks disappeared entirely. As soon as the intolerance of light had so far abated that the patient could observe an object without pain, and for a sufficient time to gain an idea of it, the following experiments were made on different days.

"*First Experiment.*—Silk ribbons of different colors, fastened on a black ground, were employed to show the complementary colors. The patient recognized the different colors, with the exception of yellow and green, which he frequently confounded, but could distinguish when both were exhibited at the same time. He could point out each color correctly when a variety was shown him at the same time. Gray pleased him best; the effect of red, orange, and yellow was painful; that of violet and brown not painful, but disagreeable. Black produced subjective colors, and white occasioned the recurrence of *muscæ volitantes* in a most vehement degree.

"*Second Experiment.*—The patient sat with his back to the light, and kept his eye closed. A sheet of paper on which two strong black lines had been drawn, the one

horizontal, the other vertical, was placed before him, at the distance of about three feet. He was now allowed to open the eye, and after attentive examination he called the lines by their right denominations. When I asked him to point out with his finger the horizontal line, he moved his hand slowly, as if feeling, and pointed to the vertical; but after a short time, observing his error, he corrected himself. The outline in black of a square [six inches in diameter], within which a circle had been drawn, and within the latter a triangle, was, after careful examination, recognized and correctly described by him. When he was asked to point out either of the figures, he never moved his hand directly and decidedly, but always as if feeling, and with the greatest caution; he pointed them out, however, correctly. A zigzag and a spiral line, both drawn on a sheet of paper, he observed to be different, but could not describe them otherwise than by imitating their forms with his finger in the air. He said he had no idea of those figures.

"*Third Experiment.*—The windows of the room were darkened, with the exception of one, toward which the patient, closing his eye, turned his back. At the distance of three feet, and on a level with the eye, a solid *cube* and a *sphere*, each of four inches diameter, were placed before him. I now let him open his eye. After attentively examining these bodies, he said he saw a *quadrangular* and a *circular* figure, and after some consideration he pronounced the one a *square* and the other a *disk*. His eye being then closed, the cube was taken away, and a disk of equal size substituted and placed next to the sphere. On again opening his eye he observed no difference in these objects, but regarded them both as disks. The solid cube was now placed in a somewhat oblique position before the eye, and close beside it a figure cut out of pasteboard, representing a plane outline prospect of the cube when in this position. Both objects he took to be something like flat quadrates. A pyramid, placed before him with one of its sides toward his eye, he saw as a plane triangle. This object was now turned a little, so as to present two of its sides to view, but rather more of one side than of the other; after considering and examining it for a long time, he said that this was a very extraordinary figure; it was neither a

triangle, nor a quadrangle, nor a circle; he had no idea of it, and could not describe it. 'In fact,' said he, 'I must give it up.' On the conclusion of these experiments I asked him to describe the sensations the objects had produced, whereupon he said that immediately on opening his eye he had discovered a difference in the two objects, the cube and the sphere, placed before him, and perceived that they were not drawings; but that he had not been able to form from them the idea of a square and a disk, *until he perceived a sensation of what he saw in the points of his fingers*, as if he really touched the objects. When I gave the three bodies, the sphere, cube, and pyramid, into his hand, he was much surprised that he had not recognized them as such by sight, as he was well acquainted with them by touch. These experiments prove the correctness of the hypothesis I have advanced elsewhere on the well-known question put by Mr. Molyneux to Locke, which was answered by both these gentlemen in the negative.

"*Fourth Experiment.*—In a vessel containing water to about the depth of one foot was placed a musket-ball, and on the surface of the water a piece of pasteboard of the same form, size, and color as the ball. The patient could perceive no difference in the position of these bodies; he believed both to be upon the surface of the water. Pointing to the ball, I desired him to take up this object. He made an attempt to take it from the plane of the water; but, when he found he could not grasp it there, he said he had deceived himself, the objects were lying in the water, upon which I informed him of their real position. I now desired him to touch the ball which lay in the water with a small rod. He attempted this several times, but always missed his aim. He could never touch the object at the first movement of his hand toward it, but only by feeling about with the rod. On being questioned with respect to reflected light, he said that he was always obliged to bear in mind that the looking-glass was fastened to the wall in order to correct his idea of the apparent situation of objects behind the glass.

"When the patient first acquired the faculty of sight, all objects appeared to him so near that he was sometimes

afraid of coming in contact with them, though they were in reality at a great distance from him. He saw everything much larger than he had supposed from the idea obtained by his sense of touch. Moving and especially living objects, such as men, horses, etc., appeared to him very large. If he wished to form an estimate of the distance of objects from his own person or of two objects from each other without moving from his place, he examined the objects from different points of view by turning his head to the right and to the left. Of perspective in pictures he had, of course, no idea; it appeared to him unnatural that the figure of a man represented in the front of a picture should be larger than a house or mountain in the background. All objects appeared to him perfectly flat. Thus, although he very well knew by his touch that the nose was prominent and the eyes sunk deeper in the head, he saw the human face only as a plane. Though he possessed an excellent memory, this faculty was at first quite deficient as regarded visible objects: he was not able, for example, to recognize visitors, unless he heard them speak, till he had seen them very frequently. Even when he had seen an object repeatedly he could form no idea of its visible qualities without having the real object before him. Heretofore when he dreamed of any persons, of his parents, for instance, he felt them and heard their voices, but never saw them; but now, after having seen them frequently, he saw them also in his dreams. The human face pleased him more than any other object. Although the newly-acquired sense afforded him many pleasures, the great number of strange and extraordinary sights was often disagreeable and wearisome to him. He said that he saw too much novelty which he could not comprehend; and, even though he could see both near and remote objects very well, he would nevertheless continually have recourse to the use of the sense of touch."

Final Remarks.

To the seven reports upon cases of persons born blind and afterward surgically treated, which are here presented in abridged form from the English originals, may be

added some more recent and more accessible ones, one by Hirschberg ("Archiv für Opthalmologie," xxi, 1. Abth., S. 29 bis 42, 1875), one by A. von Hippel (ibid., xxi, 2. Abth., S. 101), and one by Dufour ("Archives des Sciences physiques et naturelles," lviii, No. 242, April, 1877, p. 420). The cases reported here are those most discussed. I have given them considerably in detail in order that the reader may form an independent judgment concerning the behavior of persons born blind and then operated upon, as that behavior is described *before* the modern physiological controversy over empiricism and nativism. Helmholtz ("Physiologische Optik," § 28) mentions, besides those of Chesselden and Wardrop and Ware, which he gives in abridged form, some other cases also. Others still may be found in Froriep's "Notizen" (xi, p. 177, 1825, and iv, p. 243, 1837, also xxi, p. 41, 1842), partly reported, partly cited (the latter according to Franz).

In addition to the cases here given of persons born blind and then surgically treated—persons not able to see things in space-relations before becoming blind—one more case is to be mentioned; it is that of a girl who in her seventh year (probably in consequence of the effect of dazzling sunlight) lost her sight completely, but recovered it again at the age of seventeen years after being treated with electricity. She had to begin absolutely anew to learn to name colors like a child; all measure of distance, perspective, size, had been lost for her *by lack of practice* (as O. Heyfelder relates in his work "Die Kindheit des Menschen," second edition, Erlangen, 1858, pp. 12–15). He says, p. 12, that the patient had been eight years blind; p. 13, that she had been ten years so. Such cases prove the great influence of experience upon vision in space, and show how little of this vision is inborn in mankind.

When we compare the acquirement of sight by the

normal newly-born child and the infant with that of those born blind, we should, above all, bear in mind that the latter in general could make use of only *one* eye, and also that on account of the long inactivity of the retina and the absence of the crystalline lens, as well as in consequence of the numerous experiences of touch, essential differences exist. Notwithstanding this, there appears an agreement in the manner in which in both cases vision is learned, the eye is practiced, and the association of sight and touch is acquired. The seventh case in particular shows plainly how strong the analogies are.

These cases are sufficient to refute some singular assertions, e. g., that all the newly-born must see objects reversed, as even a Buffon ("Œuvres complètes," iv, 136; Paris, 1844) thought to be the fact. My boy, when I had him write, in his fifth year, the ordinary figures after a copy that I set for him, imitated the most of them, to my surprise, always in a reversed hand (Spiegelschrift, "mirror-hand"); the 1 and the 4 he continued longest to write thus, though he often made the 4 the other way, too, whereas he always wrote the 5 correctly. This, however, was, of course, not owing to imperfect sight, but to incomplete transformation of the visual idea into the motor idea required for writing. Other boys, as I am given to understand, do the same thing. For myself, I found the distinction between "right" and "left" so difficult in my childhood, that I remember vividly the trouble I had with it.

Singularly enough, Buffon assumed, in 1749, that the neglect of the double images does not yet take place at the beginning of life. Johannes Müller, in 1826, expresses the same view. But, inasmuch as in the first two or three weeks after the birth of a human being, in contrast with many animals, nothing at all can as yet be distinctly seen,

it is not allowable to maintain that everything must be seen double. Rather is it true that everything is seen neither single nor double, since the very young child perceives, as yet, no forms (boundary-lines) and no distances, but merely receives impressions of light, precisely as is the case with the person born blind, in the period directly after an operation has been performed upon his eyes.

Schopenhauer (in his treatise on "Sight and Colors," first edition, Leipsic, 1816, p. 14) divined this truth. He says, "If a person who was looking out upon a wide and beautiful prospect could be in an instant wholly deprived of his intellect, then nothing of all the view would remain for him except the sensation of a very manifold reaction of his retina, which is, as it were, the raw material out of which his intellect created that view."

The new-born child has, as yet, no intellect, and therefore can not, as yet, at the beginning, see; he can merely have the sensation of light.

This opinion of mine, derived from observation of the behavior of newly-born and of very young infants (cf. the first chapter of this book), seems to me to be practically confirmed in an account given by Anselm von Feuerbach in his work on Kaspar Hauser (Anspach, 1832, p. 77).

"In the year 1828, soon after his arrival in Nuremberg, Kaspar Hauser was to look out at the window in the Vestner Tower, from which there was a view of a broad and many-colored summer landscape. Kaspar Hauser turned away; the sight was repugnant to him. At a later period, long after he had learned to speak, he gave, when questioned, the following explanation:

"'When I looked toward the window it always seemed to me as if a shutter had been put up close before my eyes, and that upon this shutter a colorer had wiped off his brushes of different colors, white, blue, green, yellow, and

red, all in motley confusion. Individual things, as I now see them, I could not, at that time, perceive and distinguish upon it; it was absolutely hideous to look upon.'"

By this, as well as by the experiences with persons born blind and afterward surgically treated, it is clearly demonstrated that colors and degrees of brightness are severally apprehended before forms and distances can be perceived. The case must be the same with the normal human child in the first weeks after birth.

After discrimination of the luminous sensations, the boundary-lines of bright plane surfaces are next clearly discerned; then come forms, and, last of all, the distances of these.

With reference to this progress of the normal infant in learning to see, the accounts of persons born blind and afterward surgically treated are again of great value. After the famous question put by Molyneux to Locke, whether an intelligent person, blind from birth, would be able immediately after an operation to distinguish a sphere from a cube by means of the eye alone, had been answered in the negative, the opinion was accepted as satisfactory that such a person learns the distinction only by means of the sense of touch. Thus, the perception of difference would come later, after the sight of different forms, only by means of the tactual memory.

In truth, however, very many forms are discerned as different purely by means of the eye, without the possibility of aid from any other sense. Phenomena exclusively optical, which, like the rainbow, can not be apprehended by touch or by hearing, are distinctly perceived by the child at a very early period. Without touching, the different forms of objects would be perceived by means of sight alone, and that even by a child unable to touch, through movements of the eyes and head, changes of bodily posi-

tion, of attitude and posture, and through practice in accommodation and in the observation of differences of brightness.

The fact correctly predicted by Molyneux, that those born blind but afterward surgically treated can not, by means of the eye alone, distinguish the form of a sphere from that of a cube, must accordingly be supplemented to this extent, viz., that such persons are capable, just as are normal children who can see, of learning this difference of form by means of the eye alone without the direct intervention of the sense of touch; for the co-ordination of the retinal excitations in space and time by means of the intellect, quite independently of all impressions from other departments of sense, is possible, and is in countless cases actual, just as is the learning of differences of form solely by means of the sense of touch in children who are born blind and never learn to see.

THE END.

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